NOVEMBER 1981
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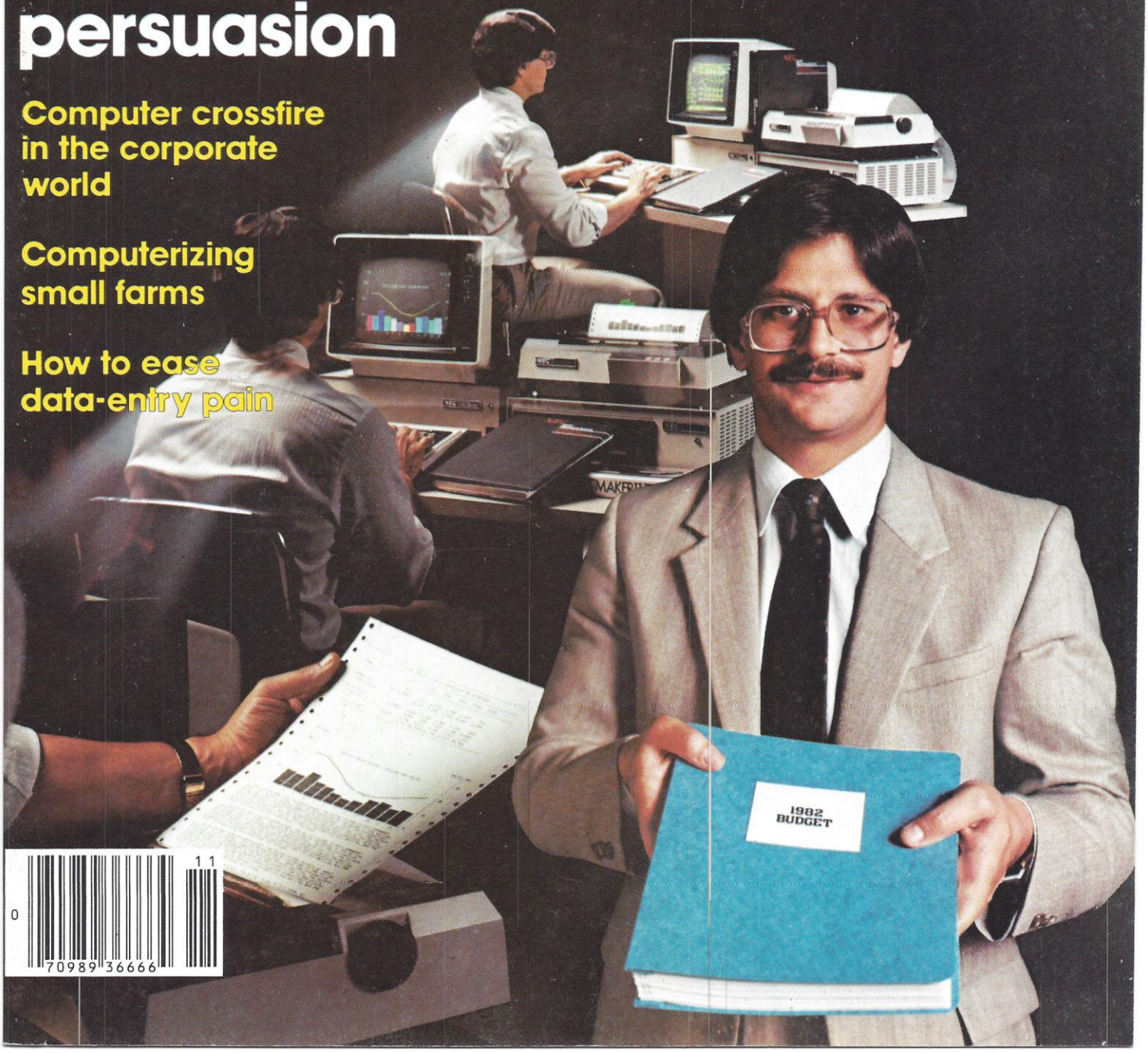
PERSONAL COMPUTING

Selling your budget through graphic persuasion

Computer crossfire in the corporate world

Computerizing small farms

How to ease data-entry pain



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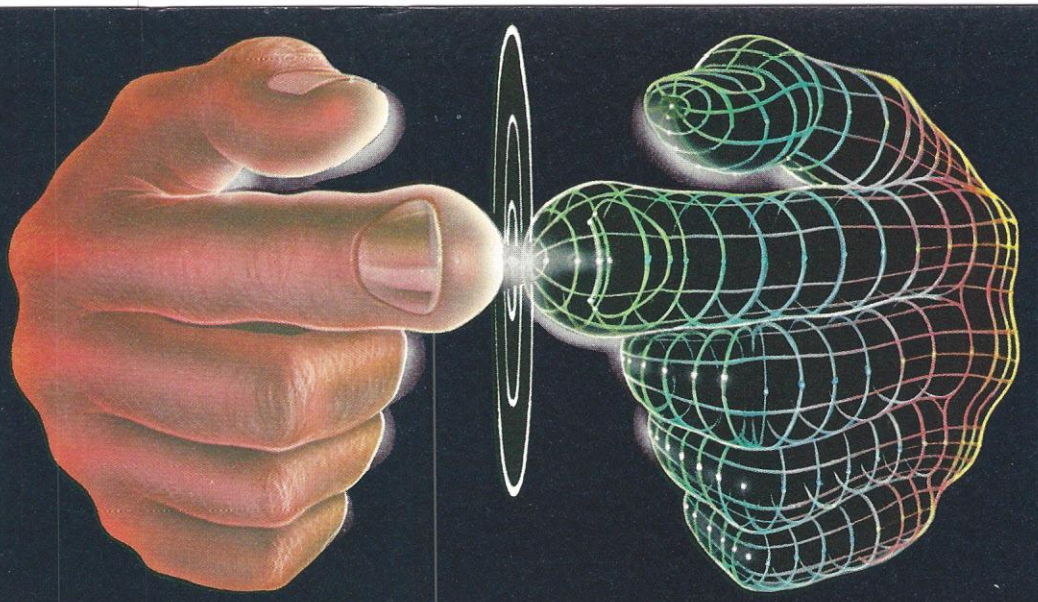

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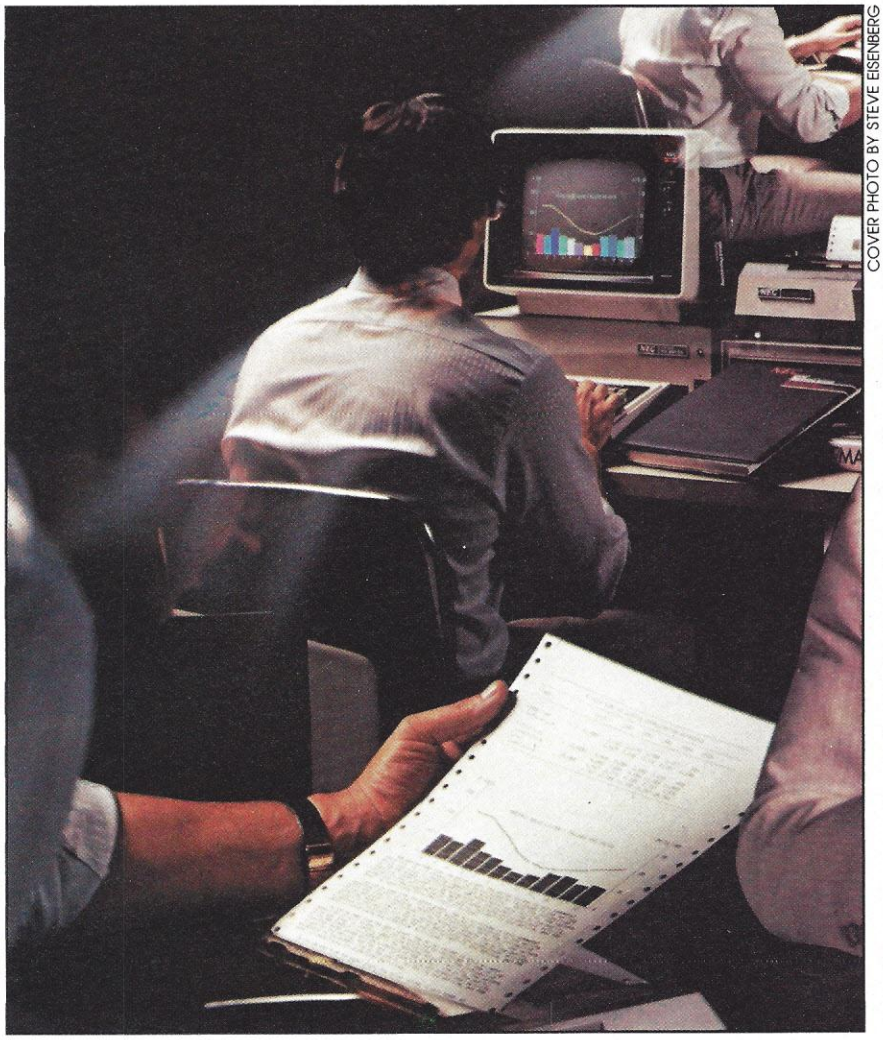
CIRCLE 2

PERSONAL COMPUTING

November 1981
Vol. V No. 11

DEPARTMENTS

150,159 copies of this issue printed

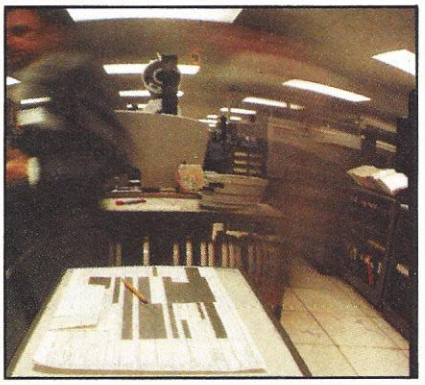


COVER PHOTO BY STEVE EISENBERG

Page 30

BEHIND THE COVER

This is the time of year that all good managers shudder. Not from the goblins who appeared in October, but from the upcoming budget battle in November and December. Those who have personal computers, like the NEC PC 8000 shown on the cover, can ease the pain of developing and selling their budgets. See the story on page 30.



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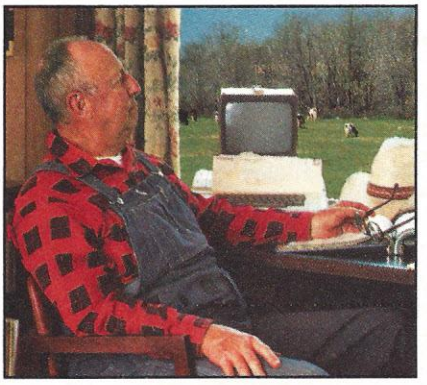

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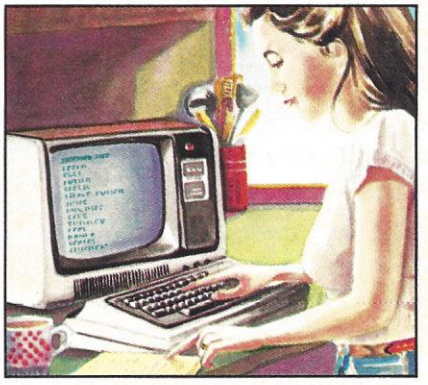

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FEATURES

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IBM is proud to announce a product *you* may have a personal interest in. It's a tool that could soon be on your desk, in your home or in your child's schoolroom. It can make a surprising difference in the way you work, learn or otherwise approach the complexities (and some of the simple pleasures) of living.

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10-key numeric pad
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9 x 9 character matrix*

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16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
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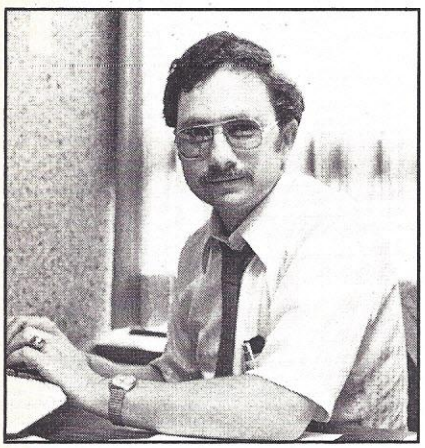
CIRCLE 3

Service?



Robert Heinlein, who has been called the dean of science fiction writers, wrote a story called *Coventry*. It was one of the series he called his *History of the Future.*

Coventry is about the United States after the fall of the Prophet, a religious dictator who seizes power in about the year 2000.

After the prophet's fall, citizens of the U.S. live under a new "constitution" called the Covenant. The document stipulates that citizens are expected to offer service to their fellow citizens. In fact, this expectation is so strong that people customarily greet one another with the salutation "Service," short for "May I do you a service?" (Much the same as our greeting, "Good morning," is a shortened form of the antiquated "I wish you a good morning.")

The story's hero is a man of a different stripe. He manages to get himself banished to Coventry, behind the Barrier. That's where people who demonstrate a lack of concern for the constant provision of service (and who refuse psychological readjustment) are kept.

Once he's in Coventry, our hero finds that people there aren't really out to do harm to one another. What they really want is to do good for themselves. Rather than being obsessed with service to others, they are concerned with their own welfare. And they're individualists; people who can take the big risk for the big gain. They are people who are willing to sacrifice to improve their lives.

They're people who don't fit into a mold.

People who use personal computers don't fit into a mold. They're not the ordinary kind of person. They're using a computer because they think it will make their lives better. They think the computers can make them more productive, so they can do more in the time they work, and thus, have more time to do the things they want.

Personal computers are doing these people a service. They're providing more enjoyable leisure time through a fascinating computer game, or just more leisure time because the computer has done their taxes, or more monetary gain because the computer makes them more productive on the job.

Certainly it is a mixture of all these benefits that's motivating the people in this month's discussion of the personal computer's penetration of American business. These folks are trying to make their jobs easier so they can do them better. Personal computers are providing the service of ready access to information.

People are using computers in their homes to provide service in the kitchen. The machines are keeping track of the family larder and even making out the weekly shopping list. (The computers can't do the dishes, but with the appearance of robot arms in some computer stores, can that service be far away?)

Of course, none of these services is provided if the machine isn't running properly. I discovered this recently when my computer went on the blink. It's terribly frustrating to find out *my* computer won't do *my* bidding anymore. Fortunately, I was able to find a dealer who got the thing back up quickly. That's not always the case, which is why some educators, whose entire day may be ruined if the machine isn't running, have found that service to the machine is terribly important when that all-important purchase decision is being weighed. The service question rests under the surface of things, like the 90 percent of an iceberg, ready to cause disaster if not reckoned with properly.

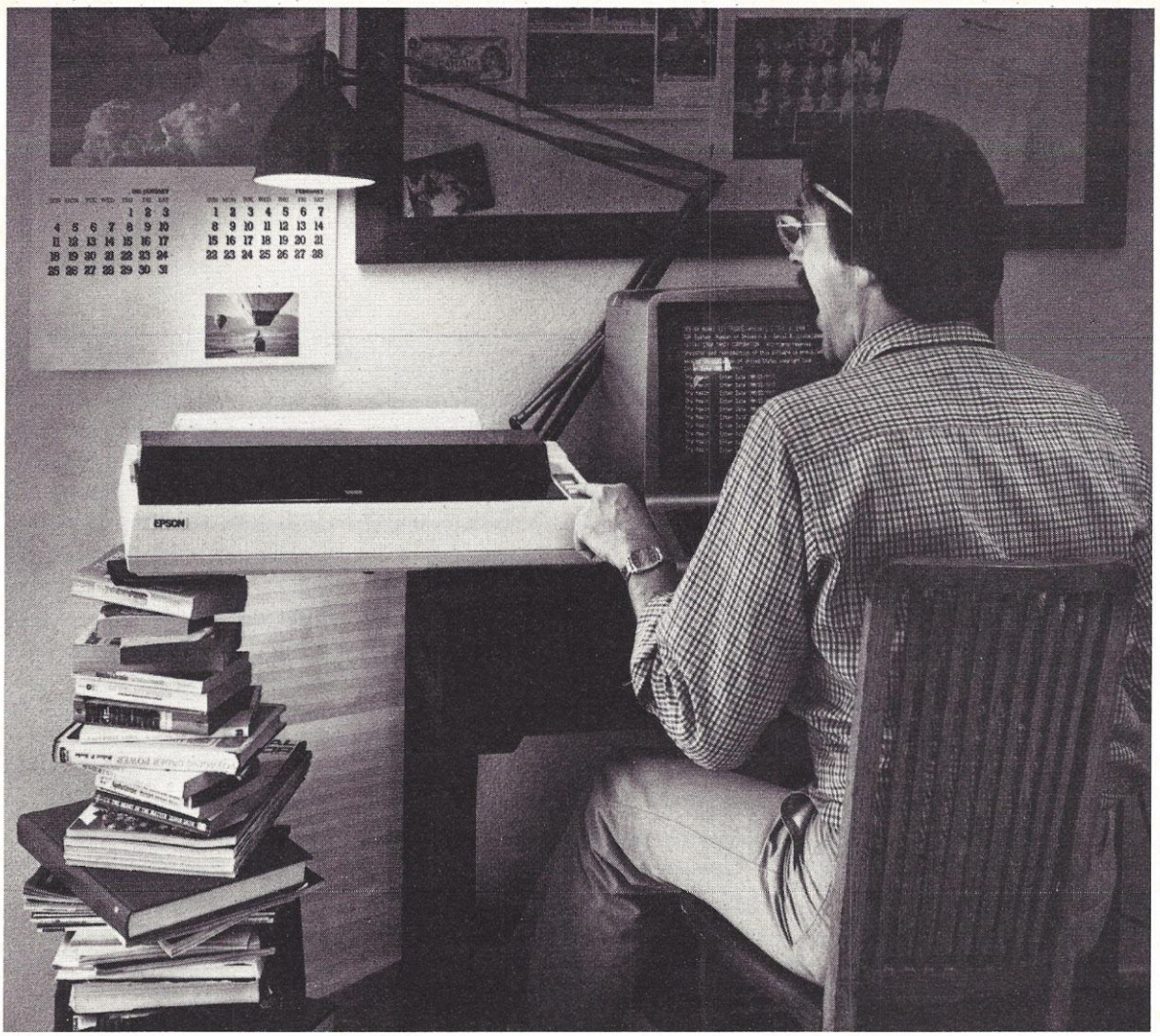
Visionary as Heinlein was, he didn't forsee the personal computer. He didn't see the tremendous service these machines could do for man. But he did see that consideration for one's fellow man must be a vital element in a complex society. He saw the danger, too, that men, in trying to ensure that all give service to one another, might so circumscribe their own behavior that the individual and the maverick are lost in the concern for the good of the group.

But it looks like the society Heinlein described won't come to pass, because the personal computers are giving the mavericks and the individualists a leg up in the world these days. And what with everything one can do with a personal computer, who knows how far the movement can go?

In *Coventry,* the hero eventually escapes and foments a revolution that ends the Covenant. What's going on now with the personal computer may have consequences just as broad as those described in the story. All because some people, in the story just as in life today, are interested in making things better for themselves—in doing themselves a service.

Care to do yourself a service?

David Gabel



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Our MX-80 was a pretty tough act to follow. I mean, how do you top the best-selling printer in the world?

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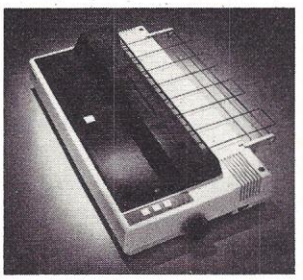
Needless to say, the specs on this machine — and especially at under $1000 — are practically unbelievable. But there's something about the MX-100 that goes far beyond just the specs; something about the way it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

All in all, the MX-100 is the most remarkable printer we've ever built. Which creates rather a large problem for those of us at Epson.

How are we going to top this?



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CIRCLE 4

PERSONAL COMPUTING

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FEEDBACK

Evaluation error

Dear Editor:

We wish to thank you for including North Star Computer's ACCPAC General Ledger and Financial Reporting System in the August 1981 article, "General Ledger Packages Streamline Businesses," by Robert Perry.

There are some errors in the evaluation, however, which we would like to correct. The G/L package can define up to 5000 accounts. It is a batch-processed system but there is no limit to the number of transactions per batch. All our other accounting software is completely integrated with the general ledger. The general ledger is a double-entry system and it is able to handle multiple divisions through the department-code field.

The reports we appear to be missing are created through the financial reporting portion of the package so that each user generates the reports he desires and in exactly the format he defines. This provides the user with unlimited report flexibility.

Peter M. Nieber
Manager, Product Marketing
North Star Computers

Program problem

Dear Editor:

About six months ago I reviewed some back issues of *Personal Computing*. Since then I have been waiting for someone to write to you and explain what is wrong with the program in the December 1980 issue, "TRS-80 Tape Duplication Utility," by Max Chauvet. To my knowledge, no letter was written. Thus, I thought that I was simply unable to transcribe programs from the magazine to my computer.

Recently, however, I gave the program another look and found that it had several errors. In line 210, there should be a "greater than" sign between the ZD and the 32767. In line 220 there should be brackets around the "0" when it appears next to the word "DEFUSR." Also, the "200" that appears in line 250 should be "2000" as the article states.

I can now understand why your editorial policy requires a tape or a disk for all programs that are printed in *Personal Computing*.

Thomas S. Fiske
San Dimas, CA

VDT addition

Dear Editor:

Your August editorial invites comment. Although most of mine are limited in scope, they are broad in their implications.

Stanley Veit's article on terminals, admittedly aimed at the unsophisticated computer user, displays a glaring omission, and an absolute falsehood. Last is first: By no measure can the VT-100 be considered the "sort-of de-facto standard for video-display terminals." It is a darn good terminal, but not for the price. Go to your nearest DEC facility and ask their engineers and technical writers what they use at home. If there is a "standard," it is the H-19 from Heathkit, our above mentioned glaring omission.

The H-19 is a smart terminal that cannot be duplicated for less than $1500, yet the H-19 costs less than virtually all dumb terminals on the market. Even ready-built (as a Zenith Z-19), it is less expensive than the ADM-3A by over $100.

It may cost like a Toyota, but it is designed like a Mercedes. Mine has operated in ambient temperatures of 140°F for six hours at a stretch without whimpering. During brownouts

last summer, it operated at 92 VAC with minor (but acceptable) shrinkage of the display. During one of the brownouts, the regulators at our local power company's substation gave out, and a transient entered my house that was strong enough to waste the compressor in my air conditioner (on the same house circuit as my computer). The charge that built up on the H-19's CRT was strong enough that I felt it push against my chest. Neither the terminal nor the computer missed a beat.

According to the Boston Computer Society, MIT students are buying H-89s and H-8s. Why? Heath equipment is designed like a Mercedes. The operating system, HDOS, makes CP/M look like a dinosaur. The documentation is unquestionably the best in the business. The software works (and is unbelievably inexpensive). You can get 16 times as many programs for your Apple, PET or TRS-80 as you can for Heath, but how many versions of Adventure does a body need? Remember that Heath computers can also run under standard CP/M, as well as Pascal.

Don Chaffee
Wellesley, MA

Software omission

Dear Editor:

In your article on Business Computing in the August issue, you ignored the very viable Texas Instruments Model 1 computer and its associated software.

Interactive Management Systems, my employer, writes custom software and software packages for the TI Model 1 including general ledger, accounts receivable, accounts payable and payroll. Our general ledger includes up to 9999 accounts and 99 sub-accounts or departments, yearly or monthly budgets, standard G/L reports and audit trail reports. The audit trail reports include sales, cash receipts, purchases, cash disbursement, payroll and general journals.

The accounts receivable package includes customer order entry, cash application, invoicing, customer-credit information and aging by current, 30, 60, 90 or 120 days. The accounts payable package includes purchase-order entry, cash disbursement and aging by due date. Payroll enters commissions, bonuses and job costing.

All the systems are menu driven and may be added to the general ledger as required.

William H. Rabe, Jr.
Interactive Management Systems
Colorado Springs, CO

Package update

Dear Editor:

Despite the acclaim Robert Perry has received on recent articles, "22 Ways to Rule Receivables" in the September issue shows a definite lapse.

To set the record straight, our SBCS Accounts Receivable *is* an open-item system, not balance forward as stated. It performs all six functions as listed on page 64, and is one of the few that automatically posts each change in A/R to G/L, keeping G/L current on a daily basis. G/L does not have to be on-line.

In addition to the features in table 1 (page 68), partial payments are accepted, and A/R can be integrated with G/L. Integration can be done at any time (daily, weekly, monthly, or user's choice). A month-end summary is also available. Preprinted forms are available from SBCS and other vendors. There are nine user-definable tax rates, including state and local taxes which can be kept separate from the others. Our A/R does not calculate financial charges as stated.

In addition to the features in table 2 (page 73), an A/R detailed report is available, and each transaction can be distributed to any G/L account. The customer list can be alphabetical and/or numerical. Analysis methods can be made per customer, by all or some customers, by account number, and by past due accounts. Unbilled invoices can also be entered (for work in progress). Sales taxes are printed separately on the reports, thus supplying a tax register. Our A/R is far from limited, being an efficient, comprehensive package that can be used alone or integrated with our general ledger.

David A. McFarling
President
Small Business Computer Systems
Lincoln, NE

System touted

Dear Editor:

The report of PolyMorphic Systems' demise, (September 1981, page 81,) is greatly exaggerated. We had near record sales in 1980 and expect to surpass them in 1981.

Our company, one of the originators of the personal computer, remains in Santa Barbara where it was founded. The Poly 88, one of our first systems, is still in demand, though the System 8813, a tremendously versatile business micro system, is now our biggest seller.

I don't have any record of Mr. Koontz, the victim in your story, having purchased either system. But if he did, and if our hardware is to blame rather than the tinkering of the local programmer he used, I will personally correct the situation. He should call me collect. Our systems have been operating without failure for years so I'll be interested to see what the problem is.

Sirous Parsaei
Acting General Manager

When Steinway builds a concert grand, they don't compromise on quality.

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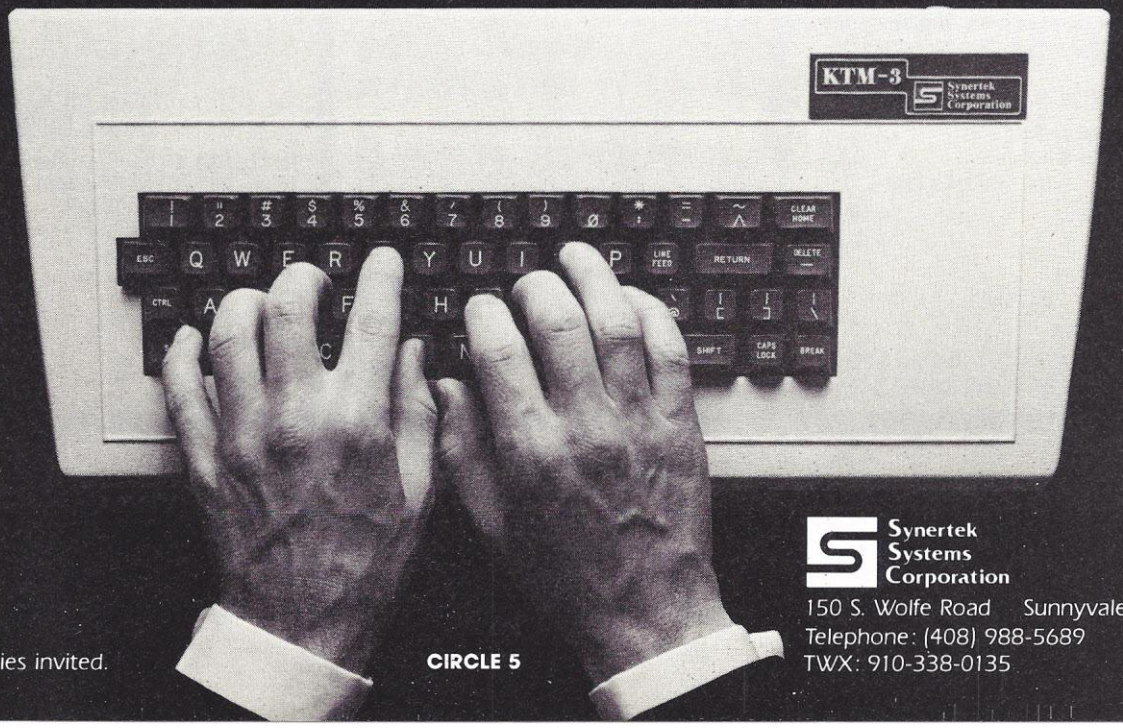

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CIRCLE 5

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META NOTATIONS. . .

MTC introduces its FREE computer "bulletin board" service. Set up your terminal or terminal software for 300 baud, parity disabled, 8-bit word length, and 1 stop bit. Dial (216) 289-8689. After the connection is established, type LOGIN META. When asked for a validation code, type META. Have fun!

* * *

In a couple of months MTC will introduce the successor to AIDS-III/CALCS. It is called AIDS/P℠ and is based on MTC's PRIMAL℠ (Practical Relational Information Management Applications Library), a powerful system for PRIME minicomputers. AIDS/P features the best of the critically acclaimed AIDS-III/CALCS but is probably an order of magnitude beyond it in power. It will be first made available to AIDS-III/CALCS owners (for an upgrade charge), then to the general public. Price will be in the $200-$300 range.

* * *

Effective September 1, 1981, Metatronics Corporation became a subsidiary of MTC. Metatronics will carry the complete MTC product line in addition to its own. Order processing and fulfillment departments have been combined to improve service response levels. MTC's superior software and supplies marketing, and Metatronics exceptional peripheral offerings should prove to be a fomidable combination. (Sorry guys, if you can't beat us, join us . . .)

* * *

MTC now offers a more complete selection of diskette products (ad deadlines prevented inclusion in anything but this column). New manufacturers are MAXELL and 3M. Definitely call for specific information. For example, MAXELL Brand 5¼" diskettes in a PLASTIC LIBRARY CASE are only $34.95 for a box of 10! SCOTCH Brand diskettes are comparably value-priced. MTC is also introducing its own PARAGON℠ Brand media products. The intent is to offer a super-high quality product at a very competitive price. For example, a box of 10 single-sided, soft-sectored, double-density, 100% certified diskettes with HUB RINGS is only $24.95! A full line of products (including HEAD CLEANING KITS, etc.) will be offered. The PLAIN JANE℠ (almost 200,000 units sold) diskette line will become part of the PARAGON℠ MAGNETICS operation (but don't quote us verbatim).

Single Sided, Soft-Sectored 5¼-inch,
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CIRCLE 6

OUTLOOK

Commodore to sponsor careers symposium

The first National Careers for the Disabled Symposium, offering first-hand information to career-oriented disabled persons, will be sponsored by Commodore Business Machines, in association with Careers for Disabled, Inc., and will be held at the Convention Center in Baltimore, Md., December 4–6, 1981. The symposium will reach out to people who, because of their disabilities, have been kept out of the mainsteam of the work force and society.

Each workshop will include a special lecture on how to obtain training and then market new or existing skills. Areas such as computer technology, starting a business, continuing education, sales, government and unions, finance, printing and the graphic arts, clerical, travel and leisure, food services, communications, and repair trades are included.

In announcing that Commodore has agreed to sponsor the symposium, James Finke, president and chief operating officer of the company, said, "Today, business leaders must assume leadership roles in helping assimilate millions of handicapped people into the work force. It is our belief that the symposium will be an important first step in bringing about this reality."

For more information contact: Careers for the Disabled, 261 Madison Ave., Suite 1102, New York, NY 10016.

Newsletter slated for medical profession

Charles Mann & Associates, Management Consulting Div., has announced the publication of a newsletter dealing with personal computer uses within the medical profession. The publication, *Micro Medical Newsletter,* is designed to provide advice on the use and selection of applications for use on personal computers in the medical office.

The current issue provides a detailed review of important accounting and insurance-claim management systems available for the leading personal computers. Included is an independent review of applications software running on computers such as the Apple II, Apple ///, TRS-80 and CP/M compatible computers.

The issue is available to practicing physicians and other health professionals when a request is made on office stationery. Subscription information and requests for a sample issue should be submitted to Charles Mann & Associates, *Micro Medical Newsletter,* 7594 San Remo Trail, Yucca Valley, CA 92284.

Programming and network courses to be offered

Courses is both structured programming and computer-communications networks are being offered in four cities by Integrated Computer Systems.

The structured program course emphasizes the systematic tools and techniques of structured programming as they apply to real-time engineering and scientific applications. Also emphasized is the development of skills which facilitate the production of reliable, well-documented and maintainable programs, on time and within budget. The network course stresses the practical aspects of network design, interfacing and protocols. Participants will learn to evaluate available network hardware and software components, to interface local systems to value-added networks, and to design and build private user networks.

For further information: Integrated Computer Systems, 3304 Pico Blvd., Santa Monica, CA 90405.

Tax-shelter data made easy

Jack Sides is an accountant who goes way back in the world of computers. He started out doing some programming on the first large-scale digital computer ever built: the 1949 Harvard Mark I, an even more primitive vacuum-tube device than the early Univac. The Harvard Mark I filled a large room and had one percent of the speed and computing capacity of a modern personal computer.

Now Sides does financial planning, tax-shelter investments and real-estate investments; and he uses his personal computer to analyze the investment and its results for each of his clients' unique financial situations. To accomplish this, he uses both packaged and self-written programs.

Of these applications, probably the most unusual is the individualized tax-shelter analyses he does, using a program he wrote in BASIC. The program takes information on how much money a person expects to make in a given year, what his personal deductions will be, and the effect of any other investments that he might have. Then it analyzes the effect of a tax-shelter investment on his income tax for the year.

Sides states that "The only other people I know who are doing this have purchased one of two large systems, selling for about $25,000 including software. I was just looking at one of the systems, and although I don't have all the software capabilities the other's have, I have a fraction of the investment. . .and if I wrote more programs I could do everything the others are doing. And my clients like my program because the output is in such a form that they can compare several courses of action and choose the one that they like the best."

Sides also uses VisiCalc for development analysis of Jojoba plantations in the Kern County-Blythe desert areas of California. He makes 10–15 year projections, changing such factors as cost, yield per acre and price per pound. That information is then compressed into an investor statement detailing cash flow before and after taxes, both annual and cumulative.

Before he gets to the point of offering this investment to someone, he estimates what he has to sell it for to make a reasonable profit. How did he do this before he bought his personal computer? "With an HP-38 and a lot of time."

Sides admits he has had some programming experience, which makes the work easier for him than for the nonprogramming professional. But the time he saves by doing these analyses with a computer allows him to work on more projects and with more clients than he could before. He feels that for 95 percent of the needs most businessmen have, they can buy packaged programs that will do the job.

Emotional diagnosis by computer

William Dossett, consultant for the Community Mental Health Center in Temple, Texas, has developed a computer assisted diagnostic system for mental health clients. Using a series of questions with "yes" or "no" answers, the TRS-80 computer works through a decision sequence until a recommended diagnosis is achieved.

"Computers have been used in mental health centers for years to perform many management information functions," says Dossett, "but until recently programs have either not been available or they have been ineffective in gathering and evaluating data for the purpose of treating clients." Dossett's system, called DSMY (based on the American Psychiatric Association's *Diagnostic and Statistic Manual*), documents its diagnosis with a printout of the decision sequence as well as reference manual page numbers to confirm the decision. This document becomes part of the client's record.

Dossett's program was presented at the Society for Medical Decision-Making meeting in Philadelphia in October.

Professional colleagues with TRS-80 computers and an interest in the DSMY program have formed a six-state network, sharing data with each other by linking their TRS-80 computers to their telephones. This enables them to achieve a more comprehensive study for large-scale experiments.

In addition to the DSMY program, the TRS-80 assists in many other areas of the clinic. Statistical-analysis software is being used to correlate facts about people who drop out of the center in order to design a program to keep them involved. VisiCalc is being used to project expenditures for the year. In addition, the TRS-80 computer is being used to determine cost-outcome for individual clients, to collect and analyze client satisfaction information, and to perform word processing for various reports and documents. Dossett states, "The bottom line is:

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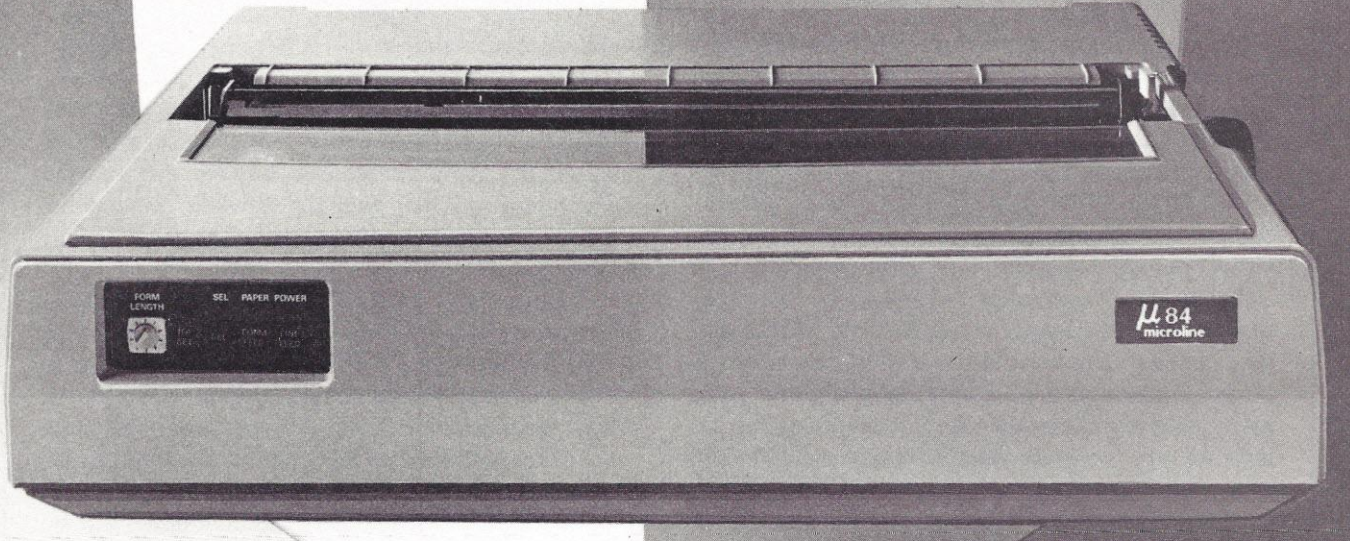

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CIRCLE 7

the technology is here, it can be used, and it is cost effective. After one solid year of research, I have found this to be true."

A ticket to easy travel

Leisure Resorts provides travel agencies with a computerized service to price and select accommodations at 130 resorts in the Hawaiian islands plus some in Tahiti and Mexico. Additionally, information is provided regarding all types of transportation at the destination and related traveler needs—from cars to lei greetings to a bottle of wine in the room. Up until recently all reservations and processing of reservations (including confirmations, invoicing and vouchers) was done manually. This limited productivity due to the enormous volume of paperwork required.

Ken Kukuda, the firm's president, decided that a personal computer was the way to go. He met with his dealer to analyze the reservation data and procedures, as well as Kukuda's desire to improve on all of the forms used. Because the situation was so unique—due to the number of properties and combinations involved—Kukuda decided he needed a $2000 custom program.

His dealer referred him to C.A.S. (Custom Applications Software), which has a master data-base management system. This system enables C.A.S. to generate a customization of the master system to fit the client's needs. Leisure Resorts then upgraded to a TRS-80 Model III, disk drives installed by Microcomputer Technology, and an Anadex printer, all on the recommendation of the software firm.

Thirty days later, after twice-weekly meetings, the system was running. Kukuda says, "The computer allows us to expand our business by offering more services and more control over what we supply, so that our clients do not encounter travel problems. (Every travel problem takes about five hours to correct.)

"The information within the computer also lets us make reports on the volume of traffic (and associated details) with every resort we serve. This allows us to negotiate a better financial position with our suppliers because we have the specific volume of business we are doing on hand. We now have real leverage with individual resorts."

Are there any future plans? Kukuda expects to expand the system to include a terminal for every reservationist, multiple printers for invoices, vouchers and confirmations, and hopes to expand the system's memory capabilities. "The cost has been very reasonable, and we amortized the entire system within six months of purchase."

Service solutions

Commodore International, through its Commodore Business Machines subsidiary, and TRW, through its Customer Service Division, now have a five-year agreement under which TRW will service and maintain Commodore personal computers throughout the United States.

Service of Commodore equipment, both on-site and at walk-in depots, began when the first group of TRW service technicians completed training on Commodore hardware.

Commodore products to be serviced under the agreement include the CBM 8032, the 4032N and 403B central processors with 12-inch monitors and 8040 universal-logic boards, the 8050 disk drive, the 4022 matrix printer, and the 8010 communications modem.

As part of the agreement, TRW will have an inventory of spare parts and specially designed equipment.

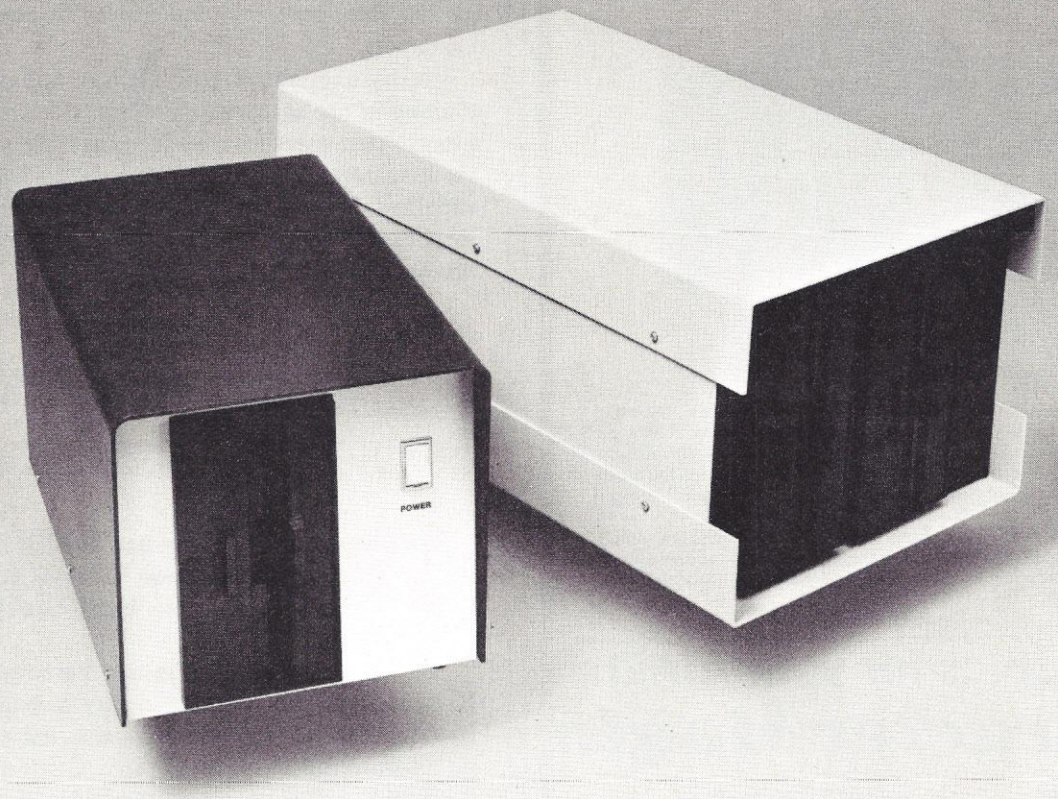
According to Maynard D. Smith, vice president and general manager of TRW's Customer Service Division, "The national service concept is particularly important to the growth of the personal-computer industry because of the wide variety of computer applications. We believe this service agreement will help fuel the growing demand for these machines among managers of businesses of all types and sizes."

Commodore projects that U.S. personal-computer sales will grow from over $1 billion in 1981 to more than $10 billion in 1985. The company believes that the bulk of this growth will be in the business marketplace where companies of all sizes are using several personal computers at multiple locations within their organizations.

"In the next decade, personal computers will be the single most important management tool in the business world," says James Finke, Commodore's president and chief operating officer.

With TRW providing service to companies with geographically diverse locations, Irving Gould, chairman of the board at Commodore, says, "Commodore can focus its resources on research

No risk Disk Drives



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COMBO-8/9+1Q — Dual cabinet with (1) Qume® DT-8 double-sided double-density drive installed (horizontal or vertical mounting)	$ 865.00
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CIRCLE 8

OUTLOOK

and development, marketing programs and support to dealers."

Currently, TRW has more than 2000 technicians at 220 locations providing service to over 80,000 customers.

Both Commodore and TRW emphasize that nothing in the agreement prevents dealers, distributors or customers from performing their own maintenance service or obtaining service from other suppliers. Many dealers currently offer service on a local basis. *(Please refer to page 84 for more information on service.)*

Home banking in Southern California

Radio Shack has been selected by First Interstate Bank of California to provide Videotex equipment for a six-month electronic home-banking pilot program.

Selected customers of the San Fernando Valley Bank are now participating in Day & Night Video Banking Service, the West Coast's first electronic home-banking pilot program. Customers use TRS-80 Videotex terminals and Videotex-equipped TRS-80 Color Computers, on free loan from the bank. They can then access the bank by telephone from anywhere in the country, with a number of transactions available.

In addition to flexible-fund transfers between any number of checking and savings accounts held by one customer, an electronic bill-paying service is also offered. Customers pre-select which of the bank's 7000 merchant base will by authorized to be paid with this service. Payments are then made on request by a direct transfer of checking-account funds to the merchant.

Balance inquiries may be made to checking accounts, savings accounts or customer-held certificates of deposit. The bank also posts general information, including current certificate-of-deposit interest rates and the locations of its automated teller machines.

TRS-80 Videotex terminals, Color Computers (4k and 16k versions), acoustic couplers and modems are all being used in this project. The bank will be monitoring this product mix to determine the best caliber of home-banking delivery and what customers want, according to a spokesman.

continued on page 20

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Ribbon	Black, cartridge $9.95	Black, cartridge $14.00
Life expectancy	Printhead — 100 million char. Drive Mech. — 10 million char. Ribbon — 5 million char.	50 — 100 million char. 5 million char. 3 million char.
Dimensions	3.8″ × 15″ × 9″	5.2″ × 14.7″ × 12″
Character set	96 ASCII	96 ASCII
Interface	Parallel	Parallel
Warranty	90 days	90 days
Printhead replacement	$29.95	$30
Cost	**$299**	**$650**

*Data source: Epson MX-80 Operation Manual

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CIRCLE 9

The most important feature of a small computer?

It's who you buy it from. Because you don't just buy a computer—you buy a package. And it has to include a source for service, software, accessories, and expertise for as long as you own your computer.

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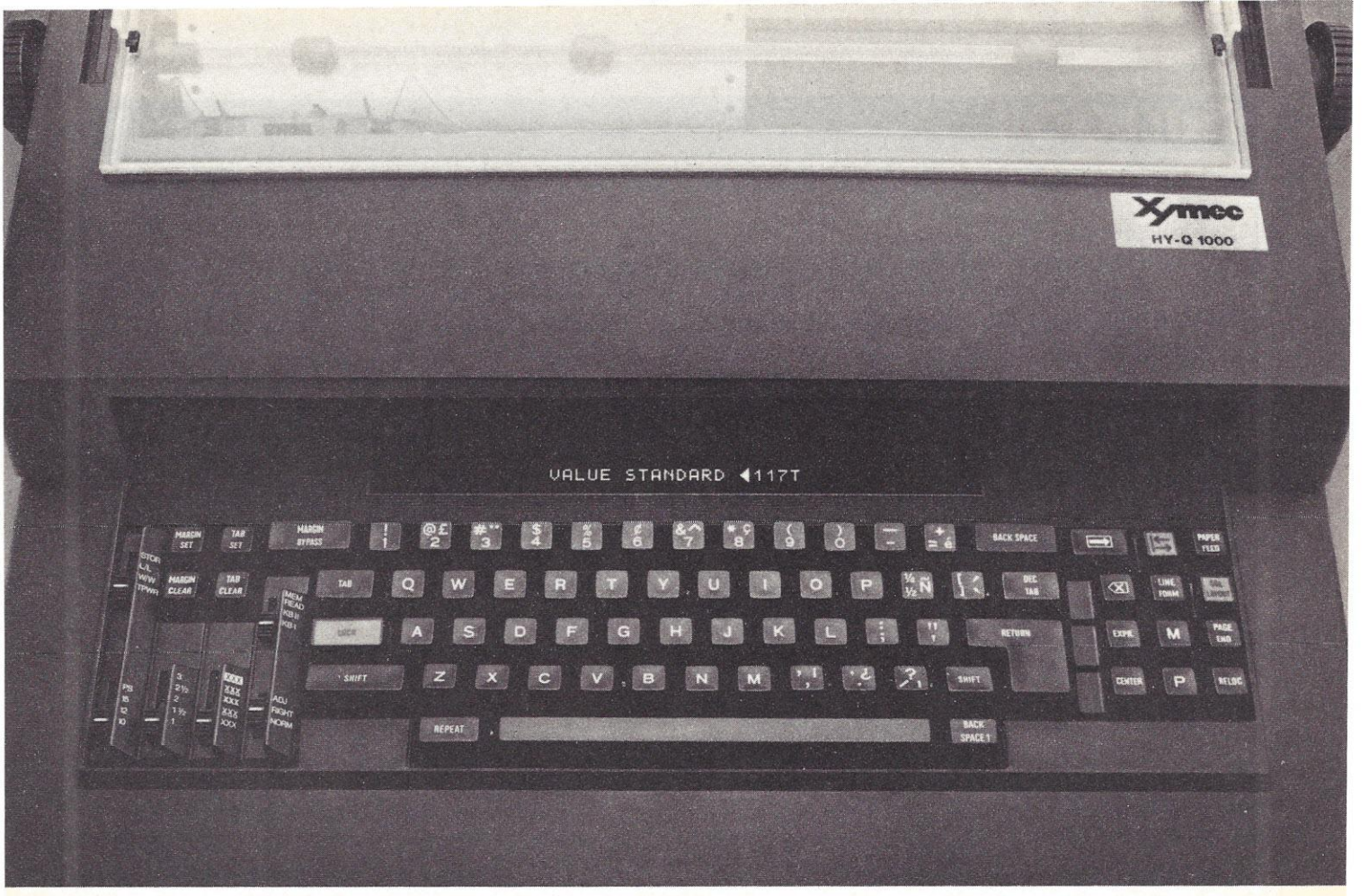
CIRCLE 17



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continued from page 16

Individual account security is being maintained through the use of one-way password encryption and individual customer I.D. numbers. In addition, repeated invalid attempts to access an account result in an automatic lockout, requiring manual intervention to revalidate the account.

New tax law affects computer owners

Should you buy your first (or next) computer this year or next? Should you lease or buy? Are there any other areas of the new tax law that might affect those who own or are thinking of owning a computer? There are at least 109 specific provisions in the "Economic Recovery Tax Act of 1981," and it will be months (perhaps years) before the impact of all the provisions is evaluated. In the opinion of many, we will have another tax bill early next year to correct the inevitable technical errors and flaws in this hastily drafted and complex set of tax-law changes. Nonetheless, the following is a brief summary of some of the provisions of the new tax law that should be of specific concern to computer owners and lessees.

Full write off for small computers: One of the provisions of the new tax law will permit businesses to deduct the first $5000 of business equipment acquired in 1982 and 1983, the first $7500 of purchases in 1984 and 1985 and the first $10,000 of purchases after 1985. This means that many small desk-top computers could be fully expensed in the year acquired. No investment credit would be allowed on such purchases, but the immediate write off would usually be better. If the cost of the computer exceeds the deductible amount, the excess would be eligible for the new depreciation method. This full write-off provision is not available for investors. It's only available if the equipment is to be used in a trade or business.

New depreciation rules: If you purchased a computer in 1981, the 100 percent write off won't be available, but the new method of depreciation (called the "Asset Cost Recovery System") does apply to 1981 equipment purchased. Under the new method, computers will be depreciated over a five-year period using specified rates for each of the five years. (If computers can be classed as research and development equipment they can be depreciated over a three year period.) For five-year-class equipment purchased in 1981 through 1984, the first year's depreciation will be 15 percent of the cost. The second years depreciation will be 22 percent of the cost and the rate will be 21 percent in each of the next three years. The entire cost will be deducted over the five-year period.

By contrast, the prior law permitted a computer owner to write off up to 40 percent of the cost in the first year if the equipment was placed in service before July. An additional 24 percent of the cost would be written off in the second year, 14.4 percent in the third year and 10.8 percent in the fourth and fifth years. This assumes a five year life, which has been typical for computer owners. Consequently, owners of larger and more expensive computers won't fare as well under the new law as under the old, but owners of desk-top size computers will be better off—assuming no other equipment was purchased in the year.

If the tax deductions won't be available because of other tax deductions or business losses, computer owners can elect to write the equipment off over a 12-year or a 25-year period using a straight-line method of depreciation. However, the election to use the slower method is mandatory for each years purchases—meaning you can't change your mind after a year or two.

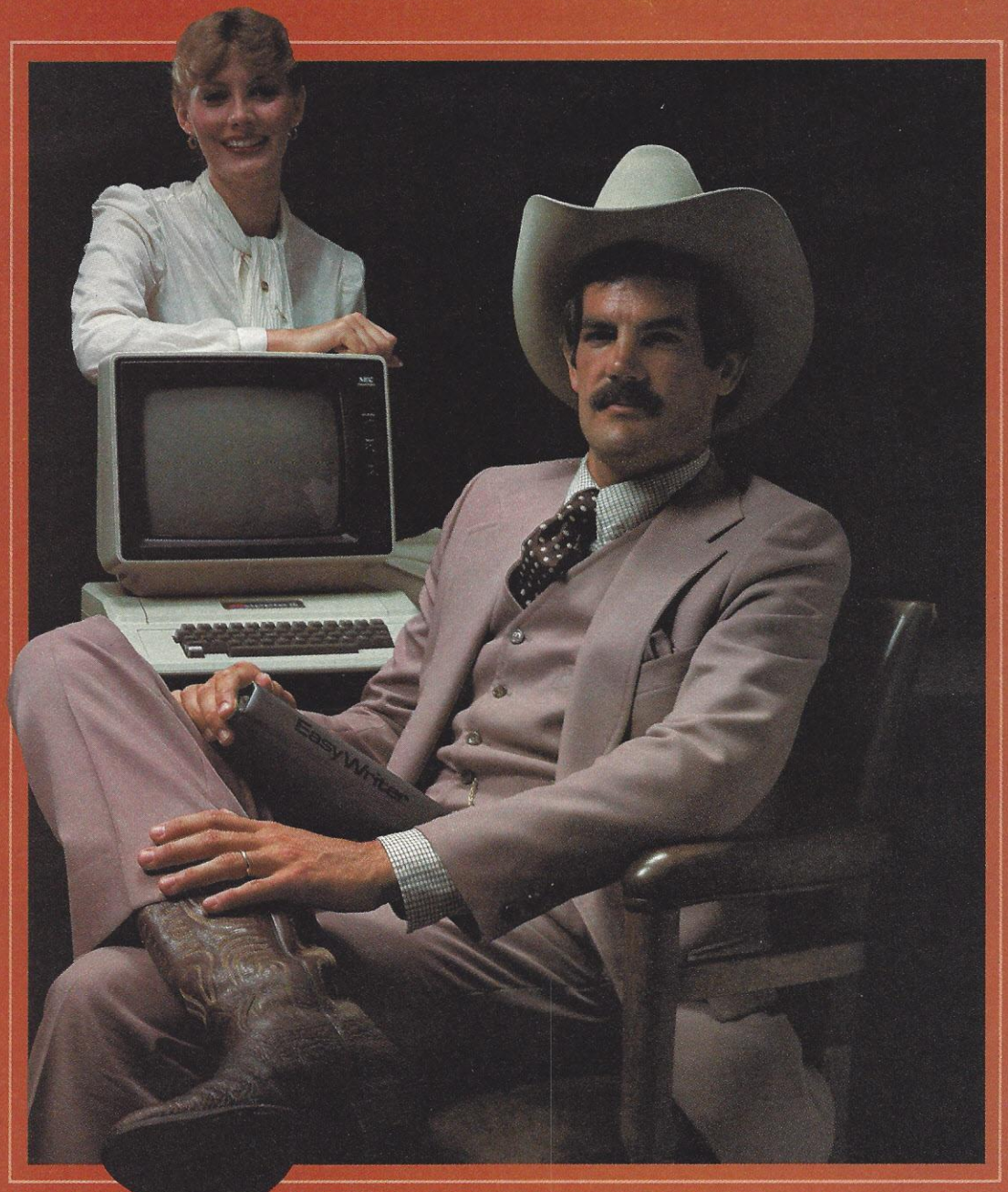
The main reason to use a slow method of depreciation is to avoid the possible loss of deductions during a prolonged start-up period—due to the existing time limit on offsetting losses of one year against profits of future years. The new law provides substantial relief in this area, which may make the slower depreciation method unnecessary. Previously, business losses could be carried forward for seven years, but the new law extends this to 15 years, retroactive to 1976.

Changes in rules for investment tax credit: Computer buyers will realize a small increase in the amount of available investment-tax credit for purchasing a computer. Under the current law, equipment with a five-year life will now be qualified to claim the full 10 percent tax credit for equipment that is depreciated over a period of five or more years. If the equipment will have a three-year useful life (autos, trucks and certain R & D equipment), the tax credit will be six percent of the cost of the property rather than 10 percent.

These new tax-credit rules take effect in 1981, including property that was acquired before the law was passed August 13, 1981.

continued on page 109

EasyWriter and the Sundance Secretary



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CIRCLE 12

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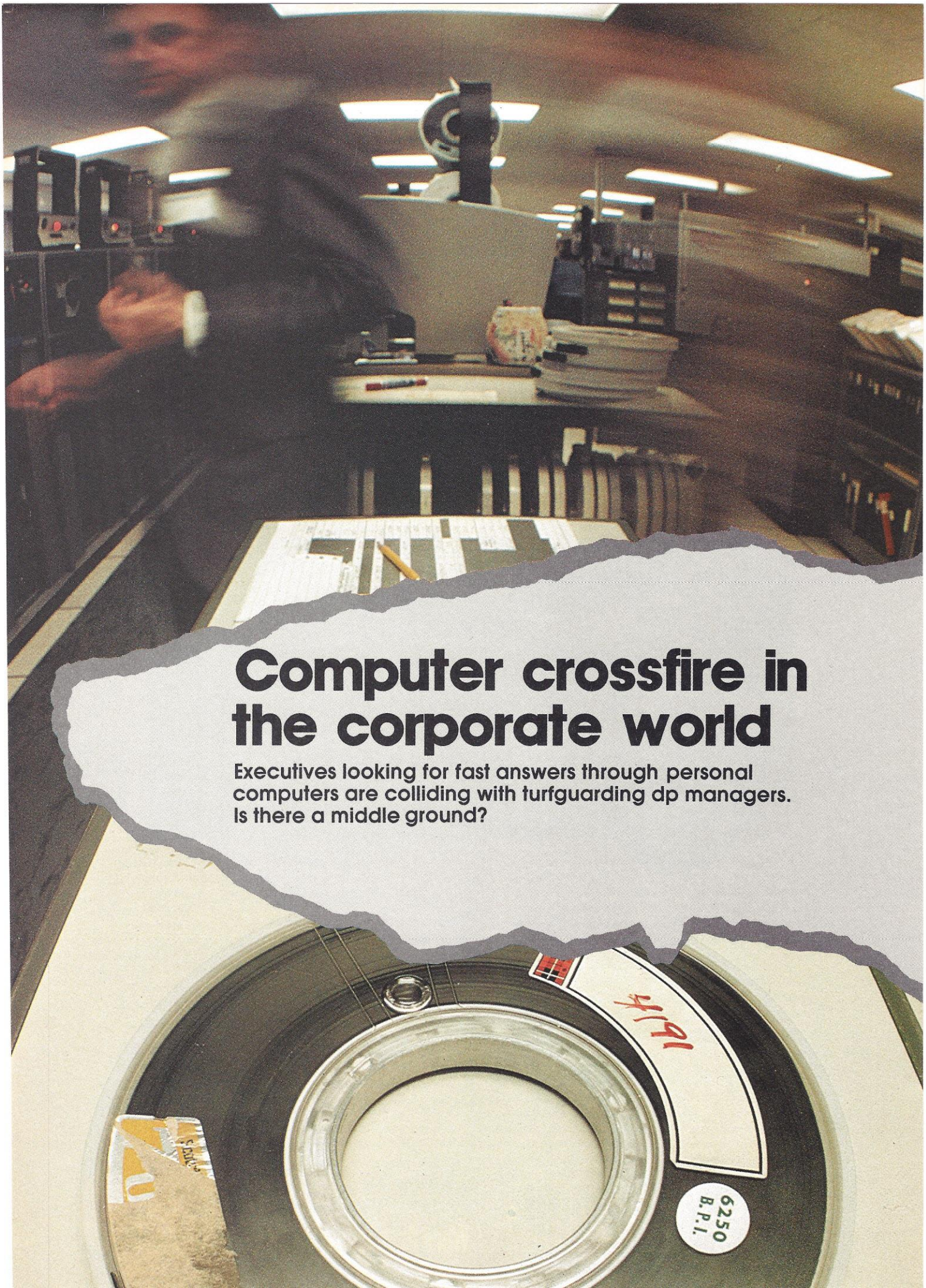


Computer crossfire in the corporate world

Executives looking for fast answers through personal computers are colliding with turfguarding dp managers. Is there a middle ground?

Jason Birmingham

BUSINESS COMPUTING

In some of the nation's most prestigious corporate corridors, innovative management-level work styles, spawned and aided by high-technology, have begun to collide with painstakingly built data-processing hierarchies. And the personal computer is at the eye of the crossfire.

More and more, middle-range executives and department managers, on the lookout for increased efficiency and quicker access to data they often need at their fingertips, are using personal computer systems to create their own personal information pools, separate from company channels. But data-processing chiefs, who traditionally hold the key to all corporate computer time, software and networks of fast electronic communication, are bristling at the arrival of these new and independent computers.

It seems that everywhere middle-level managers meet these days there's another corporate battle tale to tell about personal computers. One that's making the rounds—and in this case the story has a happy ending for the protagonist—concerns Duncan Bailey, business economics division vice president at W.R. Grace & Co., a New York conglomerate.

A year ago, Bailey, seeking to improve his analyses of the fast-changing world of commodity prices for Grace's restaurant chain, convinced the company's powers that be to allow him to purchase an Apple computer system. But it took a dragged out scuffle with the data-processing department to get that permission.

"It makes no sense, but it's all a matter of tradition," Bailey says. "It's analogous to the requirements at most schools: If you want to get a Ph.D. in banana picking, you have to take some foreign language. Why? Because of tradition. If our department can't go out and buy a piece of office equipment without first asking data processing, then we can't react quickly enough to situations around us."

Computer fever

But the introduction of the personal computer at Grace has been a success. Today, 98 percent of the company's commodities analysis is handled by the Apple system, and desk-top computer fever has spread into adjoining offices.

Bailey, his appetite whetted by his first victory, went on to an even greater achievement. "I made such a stink about our needing to get approval from data processing to purchase this equipment that subsequently corporate policy has been changed," Bailey says. "Now no corporate-level approval is needed for any computer purchases under $100,000."

With situations such as the one at Grace occurring with increasing regularity in firms across the country, many corporations—General Electric, Marriott, and Johns-Manville, to name a few—are starting to reassess their computer-purchasing policies. This would seem to be a wise step, because, by all accounts, the office is going to become the personal computer's second home over the next few years.

Completely accurate estimates are hard to come by, but International Resources Development, a Norwalk, Conn., research firm, says its surveys show that approximately 500,000 personal computers are now in use, with more than half of them employed by businesses. Another consultant from Texas puts the sales of personal computers to corporations at $680 million in 1980 and predicts that that figure will leapfrog to $4.2 billion in 1985.

Perhaps the best indication of the growth of personal computers for business purposes, and of the resistance levelled by data-processing staffs, can be gathered where the cash register rings—in the retail stores. Dick Brown, president of Computer Store, a nationwide chain, says he is seeing ever-increasing numbers of middle managers flocking to his stores in search of a machine that can do very carefully specified tasks and is available to them at all times. Brown adds that one of the major complaints from his business customers is the intractability of their corporate dp departments.

"Management people are usually interested in resolving a certain problem allied with their particular departments, be it personnel information, accounts receivable, shipping movements, whatever," Brown says. "They complain that getting information or help about personal computers, or getting access to time-sharing services through their data-processing departments is becoming difficult and very unwieldy."

> "Some middle managers are so desperate for a personal computer to improve their lot at work that they resort to dishonest methods to purchase it. Middle managers have found ways of burying the cost in several places in the budget, unbeknownst to the data-processing manager."

Hide and seek

In fact, according to Brown, some of these managers are so desperate for a personal computer to improve their lot at work that they resort to dishonest methods to purchase it. "Middle managers have found ingenious ways of burying the cost in several places in the budget, unbeknown to the dp manager," Brown

adds. "These days computers are being bought under every conceivable category in expense reports except under 'computer.'"

Though these managers may be able to bury the cost of a personal computer, it is a lot harder to hide the machine itself from the watchful eyes of the dp department. And that's when corporate policy comes into play.

In response to the proliferation of desk-top computers in its midst, Marriott has taken a hard line and ruled that any future computer purchases—"any hardware of any type, size, or shape," the corporate policy reads—must be approved by the data-processing department. Johns-Manville, for its part, has joined with Grace and other companies and relaxed the computer-purchasing restrictions formerly held over the heads of departmental managers. And still other companies, such as GE, are in the process of formulating "final" statements on this matter. The personal computer has set the slow wheels of corporate policy and decision-making turning.

A technical problem

Most data-processing chiefs prefer to publicly downplay the corporate rift over personal computers. They say their intentions are to simply set standards, both technical and physical, so that the new computer users don't end up with equipment that isn't right for the job. They add that a major concern on the corporate level is to make sure that any new machines brought into the firm are compatible with future networking plans the company may have.

"The question is more technical than some of our people out in the field realize," Len Wagner, dp manager at Marriott, insists. "For instance, a few years back one of our field offices bought some Datapoint equipment that had some software specifically written for it. But when glitches occurred in the system, our data-processing department couldn't repair the unit because it wasn't compatible with anything that we were used to working with."

Other dp chiefs, who say that they've had similar experiences, agree, and explain that the increased costs of service for "alien" equipment can offset the efficiencies the computers are supposed to bring.

"If you suddenly drop problems on data-processing departments that they can't anticipate," says William Wakefield, GE program manager for equipment analysis, "then it becomes more of a cost problem than anything."

But to Wakefield, the core of the issue is "the maturity of knowledge" of the middle managers who purchase the personal computers. "Perhaps the real role of the dp

"With the war of words and the war of machines heating up, those who line up solidly behind the personal computer have taken to dividing corporations into enlightened ones and those fossilized in the dinosaur age of mainframe computers."

department in terms of personal computers is to get these people to understand what is usable for their purposes," he says. "Sometimes new users think the computer can accomplish every task, and then they are disappointed when certain things cannot be accomplished."

Guarding turf

Many outside of the dp departments, though, dismiss these statements, calling them just words to hide the true issue: the guarding of corporate turf.

"Commonly, the dp manager resents any equipment other than that purchased from his major vendor," says Brown of The Computer Store. "He built his career on his relationship with his major vendor."

With the war of words and the war of machines heating up, those who line up solidly behind the personal computer have taken to designating corporations as being either enlightened, or fossilized in the dinosaur age of large mainframe computers.

One tale of the so-called enlightened—but here again it took some shoving to raise the corporate consciousness—comes out of Massachusetts. In 1978, Allen Sneider, an accountant at the Boston office of Laventhol & Horwath, a management consulting and accounting firm, tried to interest company higher-ups in purchasing personal computers for use in conducting analyses for clients. The company refused, preferring to rely on its established time-sharing services. Sneider was not, however, personally dissuaded; he bought an Apple system with funds from his own pocket. Since then, Sneider has used the Apple for client projections, forecasting and tax figuring. He says that the personal computer, which has spread to 40 of the firm's offices around the country—now with the blessing of the corporate movers—has changed the nature of work at the accounting firm.

"The Apple eliminates a lot of tedious number crunching and clerical work, all of which used to be very frustrating for our professionals," says Sneider. We can now spend more time on strategies, alternative solutions and client conferences. We have more time to spend developing data on which to base our decisions."

Out in the open

Sneider disdains the claims of dp managers, saying that the introduction of the personal computer, rather than hampering the flow of information at his company, has opened up the corporate structure and added avenues for increased creativity.

"The technology a corporation owns should not be behind closed doors anymore," Sneider asserts. "The personal computer allows the user to play out multiple what-if scenarios. And you're not reluctant to make changes in the calculations

"More and more, middle-range executives and department managers, on the lookout for increased efficiency and quicker access to data they often need at their fingertips, are using personal computers to create their own personal-information pools, separate from company channels. But data-processing chiefs, who traditionally hold the key to all corporate computer time, software and networks of fast electronic communication, are bristling at the arrival of these new and independent computers."

since it's all handled so quickly and so easily."

Still, Sneider has not ruled out a role for dp departments in the coming reign of desk-top machines. "They (dp-ers) should foster cooperation among the users and point the user to computer possibilities that he can't readily see," he says. "They should help the user enjoy his personal computer."

Sneider has enjoyed his machine so much that to this day, he hasn't asked his company to reimburse him for the original purchase three years ago.

One side effect of dp department's attempts to limit the use of the personal computer at the office has been the loss of some prime management talent. Many of the best and the brightest executives, interpreting corporate rejection of their plans for desk-top computer use as indicative of the company's lack of creativity and narrow-mindedness, have taken their ideas elsewhere. Ben Rosen is one who, as a stockbroker, was so frustrated by his former employer's refusal to purchase a $3500 personal-computer system a year ago that he left to start his own Wall Street consulting and research firm.

With the cooler head of hindsight, Rosen says he realizes that he simply threatened the data-processing empire at his former company. But he adds that he questions the intelligence of a Wall Street firm that thinks it can survive today without the quickest and most accessible information-processing equipment available to it, right down to the stock-broker level.

"After all," Rosen says, "having the most current information at your fingertips can be worth thousands—or even millions—of dollars in one day of active trading."

Tangling with dp managers

While Rosen was able to walk away from the conflict, others have had to face similar problems head-on. To be sure, there are inherent differences between dp managers and personal-computer devotees in businesses that no words or attempts at reconciliation can easily paper over. Data-processing managers deal in mainframes, time-sharing and massive data networks that require planning for efficient access on a corporate level. The middle manager looks to a personal computer to bypass programmers and operators usually needed to obtain electronically stored information, and to reduce paperwork, increase productivity, and improve worker performance at the site of the machine. Considering these differences, many corporate personal-computer users have grown more and more protective of their machines to make sure the desk-top systems are not "corrupted" by the tinkering of company dp professionals.

Bailey of Grace says that when he has a problem creating a particular piece of software, he relies on his own expertise—or that of others who have dealt with desk-top computers—and he won't call on his corporation's electronic wizards for help.

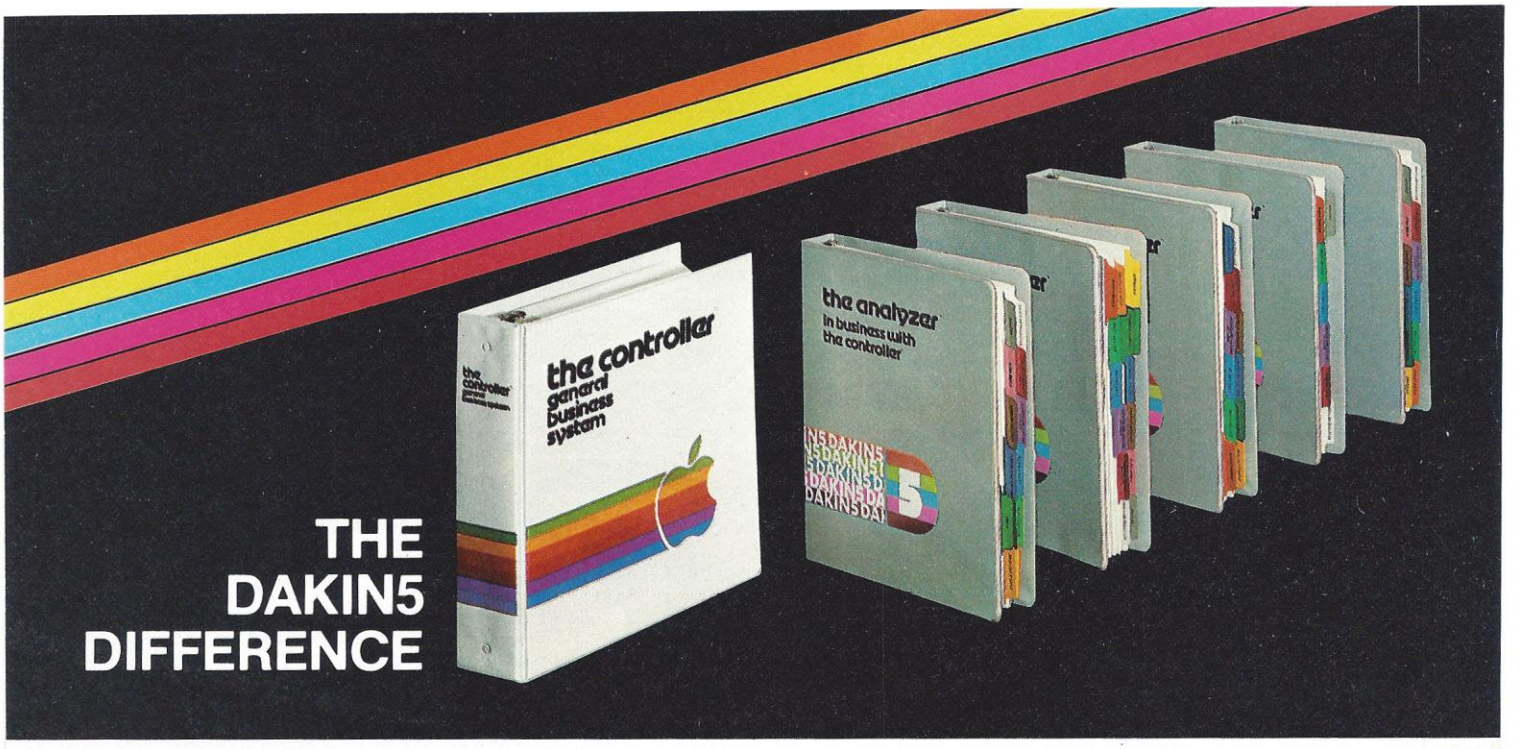
"They work differently," he says. "They sit down and define objectives, and write flowcharts, and set up 18 man-month projections of this or that. We don't want that approach on the Apple. A solution should take a couple of days to come up with. If it doesn't work within that time, we scrap it and try something new."

Bailey admits that with many offices in the same firm relying on their own information systems, the door is open for the possibility of redundancy; one department may spend days creating a program for the same data base that a nearby department has already mastered. But he rejects the notion—often put forth by dp staffs—that such duplication of work in today's corporate context is necessarily a bad thing.

"Sure there's a plus in not reinventing the wheel," he says. "But this way there is always the chance that different people will come up with different wheels—and that's all the better. In the end, all the corporation cares about is that the output is readable by its systems. Companies should set up guidelines for that.

Bailey adds, "With the kind of speed you get out of computers these days, if you burn up a little labor redoing something a few times, you're not losing anything."

"Many corporate personal computer users have grown more and more protective of their machines to make sure that desk-top systems are not corrupted by the tinkering of company data processing professionals."



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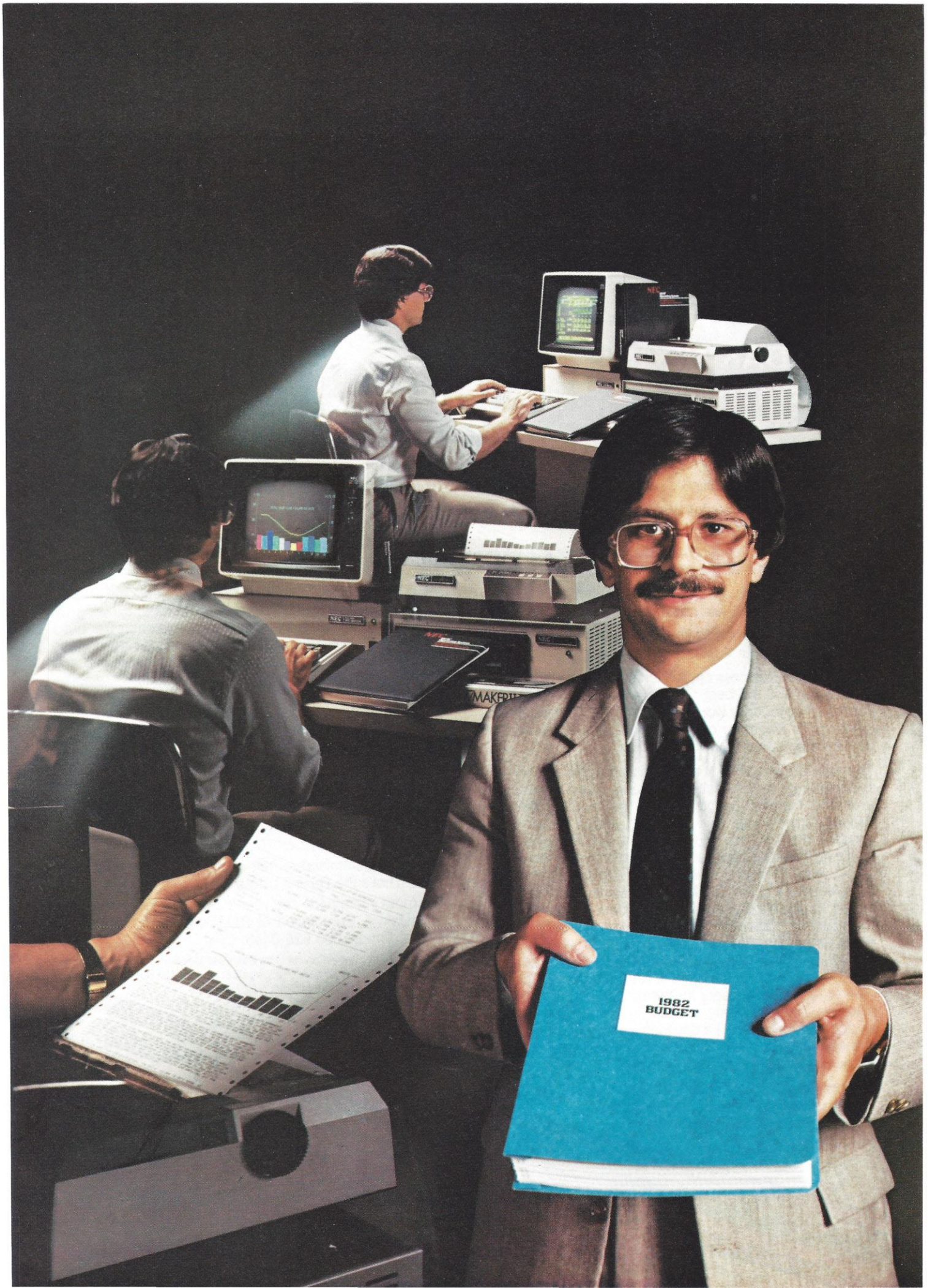
1982
BUDGET

Ken McLamb

BUSINESS COMPUTING

Win the budget battle

Scores of small-businessmen are realizing the benefits of using personal computers to streamline the laborious but telling task of budgeting

When a small business runs into trouble, the fault very often lies with the books. Not *in* the books—where the appearance of red ink is an after-effect—but with the inadequate attention and skills devoted to management of financial information. The history of new ventures is littered with the almost-successes of entrepreneurs with great ideas, products, and salesmanship who never got a handle on the money coming into and going out of the business, and suddenly found themselves broke.

The primary device for determining when and how much money will be needed in order to cover which expenses, is, of course, the budget. Traditionally, piecing together the information for a reliable budget projection has been an onerous chore for a small businessman. Checking the projection regularly against actual results requires more time than the average entrepreneur or manager is willing to divert from more "productive" activities. The result isn't always calamitous, but if balance sheets don't balance, or the numbers needed for management decisions aren't complete and up to the minute, the profitability of an enterprise will drop.

The untidiness, tardiness and error-proneness of manual accounting systems are probably the three most important reasons why more and more small businesses are computerizing. This trend has snowballed since the mid-1970s, when the first computer systems scaled and priced for small business came on the market. But at that time, commercial application programs for business were scarce and usually of poor quality, and the cost of developing customized software was too high for most small businesses.

But the quick development of the software industry over the last few

years has allowed literally hundreds of thousands of small businesses to acquire their own personal-computer systems. Today, a wide scope of programs and packages is dedicated to small business, and even to specific types of business—real-estate management, for example—and to the financial management of medical, legal, accounting, and other professions. Also part of the enticement is the ever-richer variety of basic hardware and sophisticated options, at prices that have actually decreased despite inflation.

It's a buyer's market, and even though there's still some junk to be had, there are many more good products available than there were even two or three years ago. The advice of computer-wise business acquaintances should be sought to help narrow the choice down to one or more suitable products.

Several independent software producers have earned excellent reputations for business programs for a variety of the leading personal-computer systems. And nearly all the personal-computer manufacturers have begun to offer their own or third-party business software.

Because of this increasing quality and utility in programs, the small businesses and professional practices entrusting their financial-information lifeblood to personal computers will, by all accounts, number well into the millions before the end of this decade.

The bottom line

But what have been the experiences of the small businesses that have taken the computer plunge? Has computerization of books and budgets measured up to their hopes?

"It *had* to," says Bernie Petrocelli, who thinks his publishing business has been brought back from the brink of disaster by the personal-computer system he purchased only six months ago. "The manual system was killing us," he affirms.

Petrocelli publishes *TV Facts*, a weekly guide to local television in the San Francisco Bay area. Until last May, he says, the books were always behind, receivables were sometimes misplaced or lost, some categories of costs were only loosely monitored, and, he says, "We never knew where we were financially."

Petrocelli automated with an Altos 8000 personal computer with two disk drives, plus an NEC Spinwriter for business letters and large-volume mailings. But the key to his satisfaction ("It was the single most important business decision I ever made," he says) is the Accounting-Plus package from SystemsPlus, Palo Alto, Calif. The package, says Petrocelli, is "geared perfectly to the manager, the guy who runs the business and makes hard decisions. It gives the numbers to him in a way that makes sense."

After a short get-acquainted period, Petrocelli says he got all his current financial data into the computer and has found it easy to keep his electronic books up to date. He prepares a monthly mini-budget of receivables and expenses, and watches it during the month for deviations significant enough to be investigated.

Accounting Plus is one of the more comprehensive and powerful of the integrated financial packages. In the primary version—compatible with the many personal computers having CP/M, MP/M or Cromemco's CDOS operating systems—it comprises programs for general ledger, payables, receivables, inventory, sales-order entry, purchase-order entry and payroll. The seven modules are interactive; an entry for the sales-order log, for example, will be posted automatically to general ledger as well. The software system is menu-driven for easier operation by the non-expert, leaves a complete audit trail, checks for errors on data entry, and supports five preprinted forms (sales orders, invoices, statements, purchase orders and checks). A less elaborate package—general ledger, receivables and payables—is available for Apple II and Apple II Plus computers.

"When a small business runs into trouble, the fault very often lies with the books. Not in the books, where the appearance of red ink is a belated sympton, but with inadequate attention and skills that have been given to management of financial information."

Contractor sees the light

Also for CP/M and MP/M operating systems, similar business

financial functions are provided separately or as a package from Structured Systems Group, Oakland, Calif. The general ledger, payables and receivables programs form the financial backbone of a small (six employees) electrical-contracting business operated by John Headley and his wife from their home in Brookings, S.D.

Headley is one of the many small-business computer users today who would be delighted to have an off-the-shelf program that would do the calculations for a budget, print it out, and track the course of events during the year to see how well the budget is faring. Such a program would be a wonder indeed, given the differences from one business to the next in expense and income categories and other parameters. But even though the budgetary process can't be fully automated without individualized programming, Headley and thousands of others are taking the headaches and some hazards out of budgeting by using automated data in general ledger, payables/receivables, payroll and other programs to make the process faster and more reliable.

Until he got his Imuai system four years ago, Headley spent three days a year, with a pocket calculator and a bottle of aspirin, plotting the next year's income and outgo. Nowadays, he can draw three years of data stored in general ledger, print out this year's balance sheet and operating statement, run some figures through a program he wrote to extrapolate increases in overhead costs, and in about an hour he has the new budget.

"The small businesses and professional practices in trusting their financial-information lifeblood to personal computers will number well into the millions before this decade is over."

Throughout the year, Headley closely monitors his cash flow against the budget with both the payables program (especially to have the money ready for predictable big expenses), and the receivables program (to know which payments will be due how soon and which bills are already old enough to warrant a follow-up).

Compared with the old days of manual recording and calculating, Headley says he doesn't save time—he puts about 25 percent more time into the books than before—but he gets about 10 times more usable information. As for accuracy, no customer has questioned one of his automated invoices in the past two years; he used to get about two calls a month complaining of errors on the high side, and he'll never know how many errors he made in his customers' favor.

Rises to the occasion

At a considerably higher level of data-processing size and complexity, controller Charles Stevens uses all the Structured Systems Group's financial programs in the preparation and updating of budgets for Burczynski Bakery, which operates 14 retail bakeries in Buffalo and Rochester, N.Y. The programs run on a unique hardware system, configured around a 64k Telmet computer, designed to Stevens' specification by consultants.

At Burczynski, budgets are devised and tracked on both a consolidated and branch basis, and according to support functions such as shipping and administration. Further, Stevens does a lot of "what-if" projections in working up the annual budgets and to spot desirable revisions from month to month.

"We did a lot of this manually in the past," Stevens says, "and because re-doing the figures was so time-consuming, we didn't make changes as frequently or effectively as we do now."

With automated processing, he says it's easy to make changes in projections. "If we gain a large new account, we can quickly incorporate the higher anticipated revenue and expense, or follow the reverse procedure if a piece of business is unexpectedly lost. You know quickly what result this action will have on your fixed and variable costs and thus on net profitability. It's nice to know during the month where you stand, instead of finding out after the fact whether you've been on target or not."

On the horizon

Some types of business are inherently more budgetable than others. In property management, which is highly stable and conducts business very much by the numbers, budgeting and keeping an eye on the budget are "the essence," says Edgar Lopez.

Lopez heads IMA, which manages several hundred office and apartment

buildings and shopping centers in the vicinity of Las Cruces, N.M. Lopez became the area's pioneer in introducing personal computing to real estate when he bought a North Star Horizon four years ago. That was during the dark ages of software (North Star now provides an impressive financial package for its machines), and Lopez trusted luck by hiring a part-time student to develop his programs in-house. A lot of unusable programs have originated with such semi-pro work, but in Lopez's case the result was "great," he says.

Each property under management is listed as a budgetary item for annual and monthly monitoring; the computer will "red flag" a late rent payment or signal other out-of-the-ordinary receipts and disbursements. Consolidated expenses (which are IMA's responsibility), janitorial service, and some utility expenses are budgeted and tracked separately. Lopez also does some budgetary "what-if" projections, particularly to evaluate future internal rate of return on properties.

For the paperwork-intensive type of business he's in, Lopez says computerizing is "fantastic." It greatly reduces time needed not only for calculations, but also for churning out contracts that differ only slightly

continued on page 104

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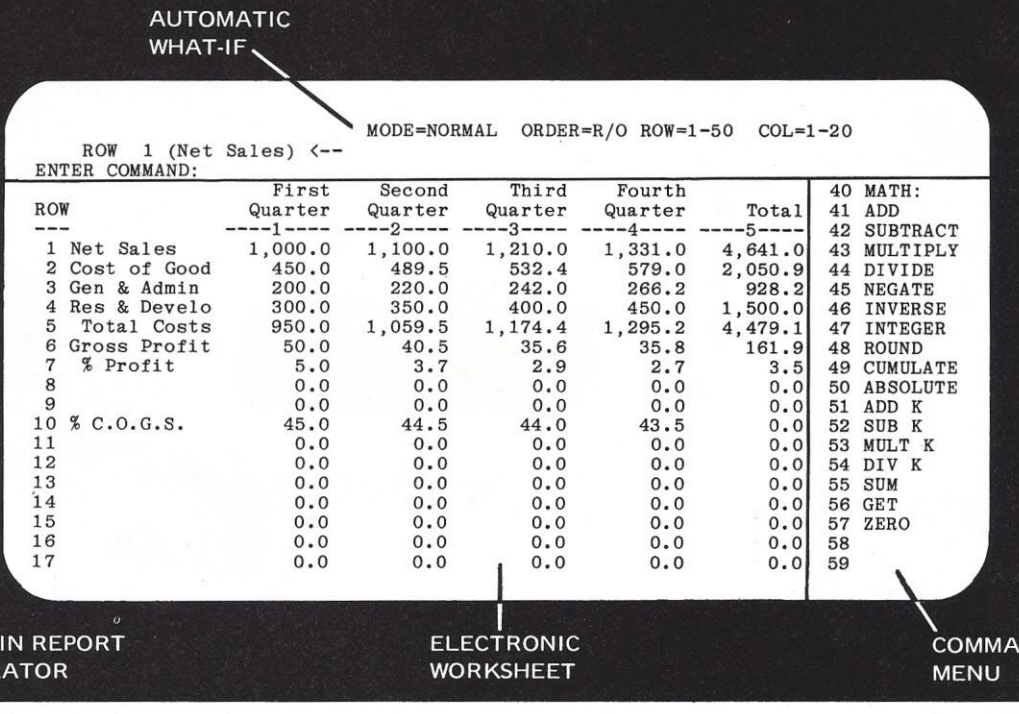

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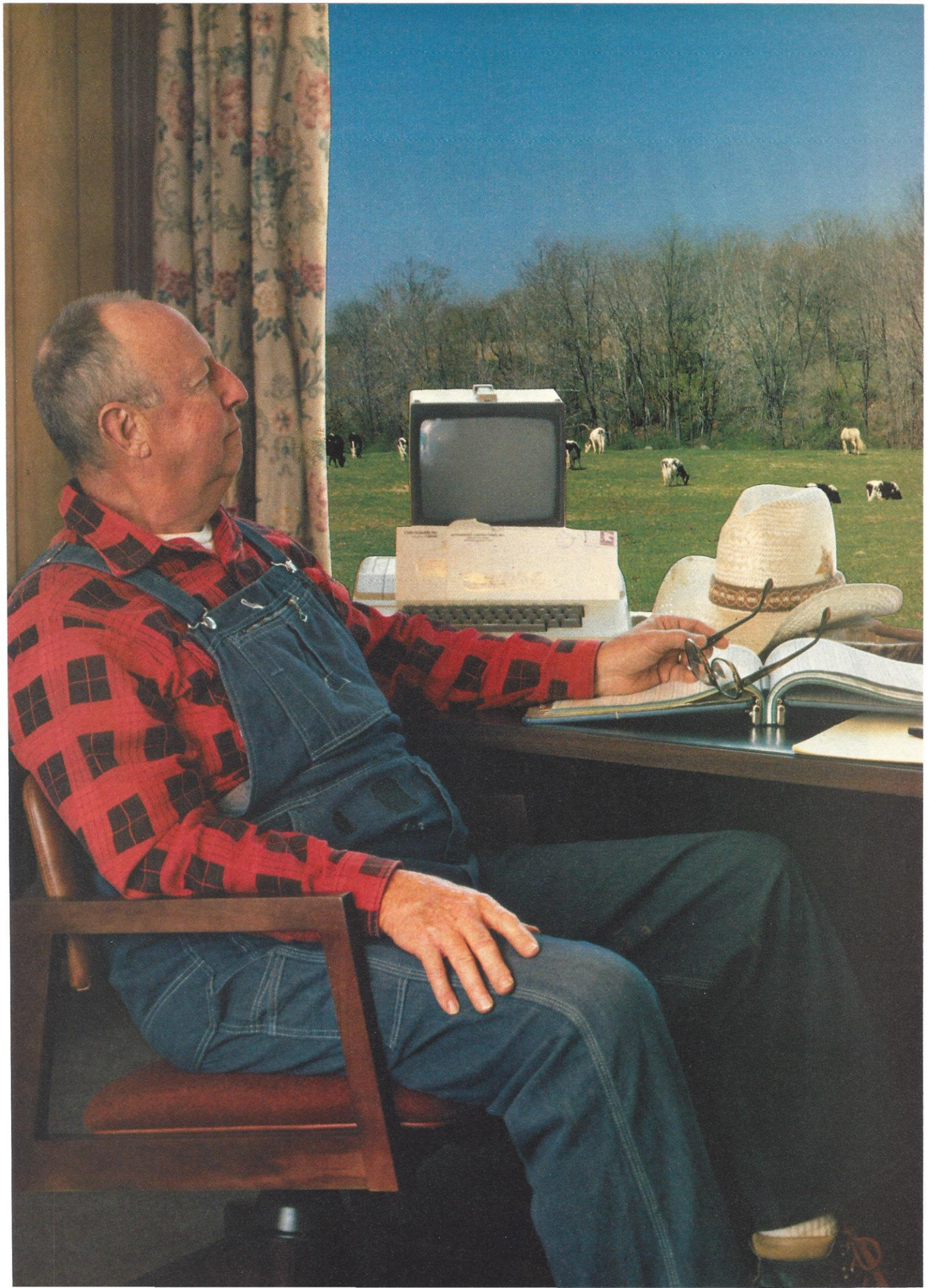
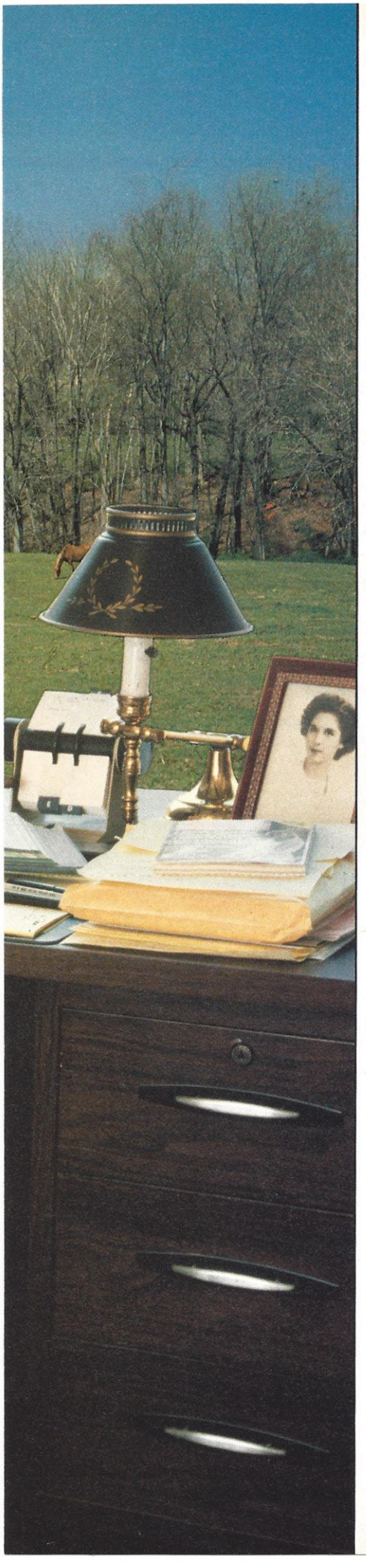




Alan Redding

BUSINESS COMPUTING

Cultivating by computer

Still keeping an eye on the sky and an ear to the ground, farmers are finding that computers are another, and perhaps more trustworthy, tool

Clara Thurston had almost finished a long day of work on her dairy farm, The Riverside Farm, situated in the gentle countryside along the border between Fryberg, Maine, and New Hampshire, between the White Mountains and the Atlantic Ocean. The third milking of the day was completed and she was finally able to sit down and think about the day's events and her 270 cows.

Thurston was reviewing a computer printout giving a cow-by-cow breakdown of the milk each had given that day. Riverside Farm "is one of the larger farms in the area," Thurston explains, although it is small compared to the corporate farms of America's foodbelt. The printout came from her Bou-Matic Milking Systems' computer, which tracks the production of each cow.

Running down the figures, Thurston was struck by one cow, whose milk production seemed lower than usual. With 270 cows to keep in mind, Thurston couldn't immediately recall if that cow really was producing less milk than usual.

Fortunately she didn't have to remember. She turned to her computer and started calling up the cow's production-record average (10-day average) and began comparing previous days' printouts. And in a matter of minutes Thurston had her answer: The cow's production was low and had been steadily declining for a few days. It was possible, she concluded, that she had a sick cow on her hands. She would look into it immediately.

The beauty of the computer, Thurston has discovered, "is that it alerts us that something needs to be checked." When the farm was milking into jugs and keeping records by hand, production records were closed once a month. "That was the only time you knew production," she points out. "Now you know each milking." With that knowledge, Thurston can spot sick or pregnant cows very quickly and easily.

*****

In the midwest, a farmer walks his fields the way his father, grandfather and generations of farmers have done before him. Periodically, the farmer bends down and takes a handful of the soil. Where his father might have squeezed the soil, massaged it with his fingers, sniffed it, and intuitively examined the sample, this farmer drops it into a clean envelope.

The envelope will be sent off to a laboratory which will send the farmer a computer printout of the chemical analysis of the soil. The analysis, however, is only the beginning for the

PHOTO COURTESY OF THE SOURCE

newest breed of farmer. From there the farmer will input the results on his own personal computer along with other data such as the types of crops he intends to grow. Using a modem, he taps into a university extension-service data bank which contains the latest updates on all the available fertilizers, prices, and specifications. Calling up an agricultural network program, the farmer can then run his soil data, crop data, and fertilizer specifications along with the stored data concerning the availability and price of fertilizers. The result is a list of fertilizer options from which he can quickly select the most appropriate fertilizer at the best price.

*****

Sometime, probably after World War II and before "Little House on the Prairie" appeared on television, farming became agribusiness. Even the remaining small farms of today, however, are complex businesses. A small farm often has a variety of products and customers, complicated assets and record keeping, extensive tax considerations, and all the problems that any business has in allocating resources and controlling production, planning, costing and budgeting. While farming may be one of the oldest human endeavors, new information, research and technology are applied to the business of farming every year. The personal computer is one of the new developments that are helping farmers at their work. Like any sophisticated business attempting to keep track of multiple operations, the small farm is benefitting from the organizational ability of a personal computer: Small farmers must make hard dollars-and-cents decisions regarding crop rotation, fertilizer, budgeting, personnel, and day-to-day operations.

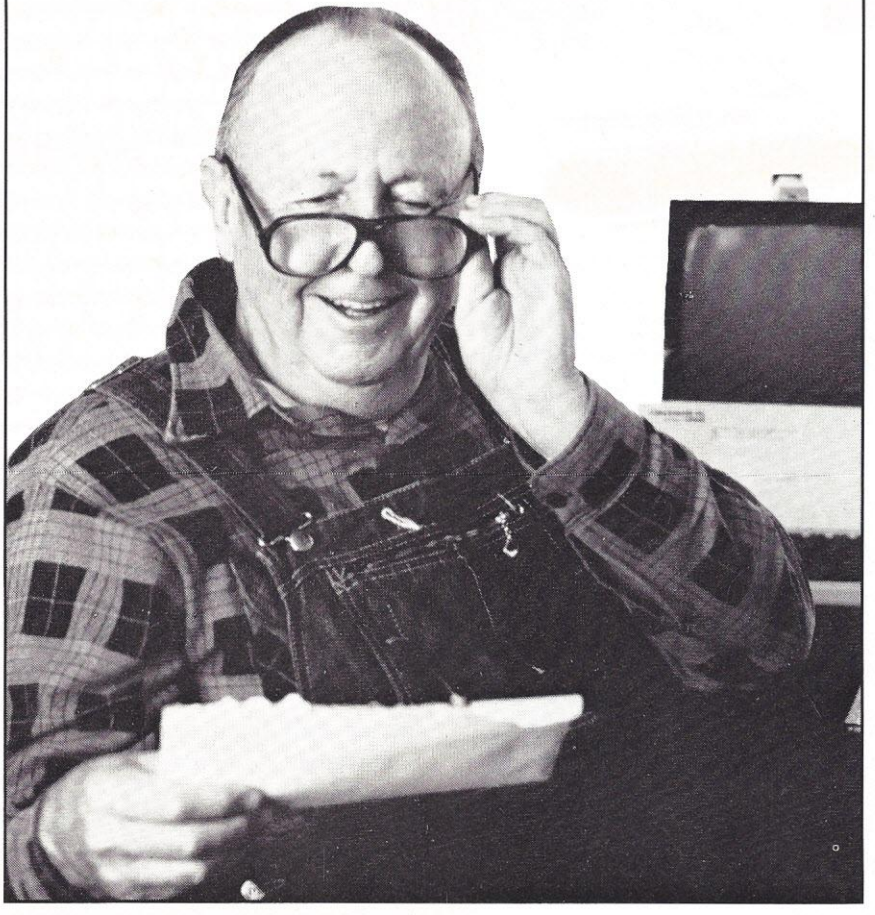
Faced with automated feed operations and other agribusinesses using highly sophisticated large computers, along with corporate farms with in-house information systems managers, these small farmers appear to be losing the struggle to compete. Appearances can be deceiving, however. An increasing number of smaller farms, like The Riverside Farm, are turning to personal computers to do for them what the large computers do for the large corporate farms.

Chart them crops

Wesley Bailey Jr. has been using his Ohio Scientific personal computer for about three years in the operations of his Tunica, La., farm. The 36-year-old farmer has always enjoyed electronics and even went so far as to learn FORTRAN and machine language in college before turning his attention to his family's farm. Now Bailey and his father operate about 2000 acres of beans, wheat and rice, and they have slowly been applying the personal computer to the family farm.

Most of Bailey's programming is for the operational aspects of the farm. He has "a lot of little programs for spray rigs and field records," he

"In the midwest, a farmer walks his fields the way his father, grandfather and generations of farmers have done before him. Periodically, the farmer bends down and takes a handful of the soil. Where his father might have squeezed the soil, massaged it with his fingers, sniffed it, and intuitively examined the sample, this farmer drops it into a clean envelope."



states. He can chart crop rotation (which crop gets planted where). He can also track production costs and all field records. "I like programming," says Bailey, who has written all of the operations programs himself.

Bailey has even stepped in to help a local Tunica accountant who was trying to develop accounting packages in BASIC to be run on Radio Shack computers—which are popular with many small farmers.

A bit bashful

"Personal computers will really catch on," states Bailey, "when the software is straightened out." When small farmers are easily able to buy commercially available programs, more farmers will adopt personal computers. Although Bailey himself is a bit bashful about suggestions that he publish some of his own farm operating programs, the Mississippi State University agricultural program is keeping a close watch on his progress with the personal computer. Also watchful of Bailey's progress are the local county extension people who convinced him to go on public television and explain his personal computer applications.

Bailey is also keeping a close watch on developments in the market, especially the growing data banks. He has not yet tapped into the available agricultural networks. Part of the problem with the computer networks is that they are still expensive for a small farmer and much of the available information, Bailey fears, won't be applicable.

Cost of the networks is a serious consideration. The computer doesn't make him any money, Bailey readily admits, but it does save him money by saving him time. "We save money be getting reports on individual (farm) enterprises," says Bailey. He gets better, more detailed, and more accurate information than he had in the past.

Right now Bailey is operating his personal computer with a printer, a modem, and a single disk drive. But, he expects to upgrade soon to give him more flexibility—and to prepare for the day when he puts the farm's entire operation into the computer.

Bailey realizes that he will have to have a good accounting program ready by then. In his estimation, the trouble with commercial accounting packages is that they aren't able to encompass all of the separate classifications and departments that make up farming as a whole. Farms as small as 700 acres, he suggests, could find that the personal computer will make them more competitive, although a computer itself won't make small farms instantly competitive with large agribusinesses. "It will help farmers get a lot closer to the point where they can compete," he notes.

Tinkering in Tunica

Bibb Inc. is one of the largest farms in Tunica, La., with 6500 acres of cotton, soybeans, wheat and rice. In four years, Owen Bibb's TRS-80 Model I with 48k and two disk drives has worked its way to the center of his operation.

The most recent application he found is in generating social-security reports in the proper report form. Unlike Bailey, Bibb does not yet use his personal computer for farming operations, although he is developing a new program for that application. Instead, the computer is used to handle mainly bookkeeping functions. "The main problem we have is finding out exactly how much it costs to grow a bushel of beans, for example, " states Bibb.

A farmer's reticence

Bibb began with Radio Shack accounting software and admits that at first it wasn't easy to make his farm books conform with the more general-business software. He liked the old way of keeping the books, but now that the change has been successfully made, Bibb isn't about to go back: "It used to take me hours to go through the billing." More than just saving time, the computer helps Bibb be a better farm manager, "now that I know where the money is going."

Every day Bibb gets a trial balance. By knowing exactly where he stands, Bibb feels he can make better decisions than he has made in the past. Those decisions might include how much of each crop to plant, how to allot men and equipment, and which fertilizers to purchase—business decisions that farmers face every day.

Now Bibb is looking at new software while he contemplates upgrading his system. A TRS-80 Model II seems to be a likely choice, to which Bibb would add a hard disk. The personal computer has indeed become a key business tool for Bibb.

Tunica, La., home of both Bibb and Bailey, is regarded as a particularly advanced area for the application of computers to farming. In general, personal computing by farmers has grown in relation to the lowering of costs, state some Mississippi State University farm extension-service staff members.

Slow but steady

But slowing down the advance of computers has been the lack of specific farming software. The computer companies probably don't see enough profit in farming software, say extension-service staffers. And it appears that very few computer consultants who would generate software are coming into the field. As an example, Eric Balkan, publisher of *Computer Consultant* newsletter, searched his files to find a computer consultant specializing in farming—and he could come up with only one.

But within five years, staffers at Mississippi State predict that this situation will change. Almost every-

thing a farmer does, they point out, can be computerized. Right now the school offers about 35 programs for farmers. Fifteen more programs will be added this year alone. Most of these programs are in accounting areas. But what will still be missing, they add, are elaborate financial-management programs and capital-investment programs from a farmer's standpoint.

Turning on

The speed at which more farmers are adopting computers is increasing now that programs are becoming available. And small farms are now getting involved in personal computing. In five years, 80 to 90 percent of the acreage in counties like Tunica will be farmed with the aid of a computer, according to Mississippi State University projections. "There must be a small end," says one staff member. "Obviously small part-timers couldn't justify purchasing a computer, but a diversified farm of as little as 300 acres could benefit from it." All types of farms, including dairy, crop and livestock, seem to be turning to the computer at an equal pace.

Dr. John Nevins, a computer researcher for the Tennessee Valley Authority, notes a certain irony in the movement by farmers to computers. Usually new developments start at the top of the agricultural pyramid and extend down to the local farmer. When personal computers started coming down in price, however, local farmers began showing "unbelievable interest" and started buying the machines. Then they went to the county extension agents and requested help in using them. "What we are seeing is a grass-roots cry for help," says Nevins. In the past, technological advances were usually pressed upon farmers by the local extension agents. This time, the extension services were caught somewhat unprepared.

Now the universities with agricultural programs and the extension services are rushing to fill the void and satisfy the demands by farmers, particularly for software. A farm is a small business just like any other small business, explains Nevins, and it requires a considerable amount of record keeping. In this area alone, "the computer can be an extremely valuable tool."

Number crunching

Record keeping is what Richard Uhrenholdt, an Elgin, Neb., farmer, is doing most of with his computer. Like the Nebraska pioneer farmers of several generations ago, Uhrenholdt finds that being a pioneering, computerized farmer can be lonely and frustrating. "I wish there was a users group nearby," he says, recalling his solitary efforts to bend the available software to the needs of his farm.

> "While farming may be one of the oldest human endeavors, new information, research and technology are applied to the business of farming every year."

In January, Uhrenholdt purchased a TRS-80 Model II and began getting down to business. He picked up some general-ledger and accounts-payable software locally, after making a considerable number of telephone calls looking for programs. What he purchased, however, was not at all what he wanted.

The trouble with most commercially available accounting software, he explains, is that it is based on double-entry bookkeeping. Most farmers keep single-entry books. Fortunately, Uhrenholdt had taken some courses in bookkeeping and accounting and was familiar with the double-entry system. After persevering through the difficult conversion process and learning period, he is now enthusiastic about double-entry bookkeeping, "I think it is the way to go," but with some qualifications. "What we need is a good double-entry bookkeeping program with farmer terminology," Uhrenholdt concludes. Farmers do not think in terms of debits and credits, inventory, liabilities, and assets, but in terms of bushels, head of cattle and acres.

Uhrenholdt runs a "fair-size farm" which produces a variety of crops and some livestock. In time he expects to apply the personal computer to the work of farming, such as crop rotation. He is also interested in a feed program like that offered through AGNET, a University of Nebraska network which allows farmers to tap into programs and data banks. Right now something like AGNET is a little expensive for Uhrenholdt, who is not ready to take advantage of it. Connect time plus the expense of the long distance telephone call end up costing about $20 per hour, he estimates.

A pioneering spirit

When Uhrendholdt bought the machine, he had two months to seriously work with it before the weather cleared and field work could begin. Since then he hasn't had much time to work with the computer himself, but his wife has been using it for both the household and the farm bookkeeping. "It takes time to change our whole system around," he says, trying to keep things in perspective.

Farmers using personal computers really are pioneers, according to Robert Jolly, an extension economist at the University of Iowa. He is not

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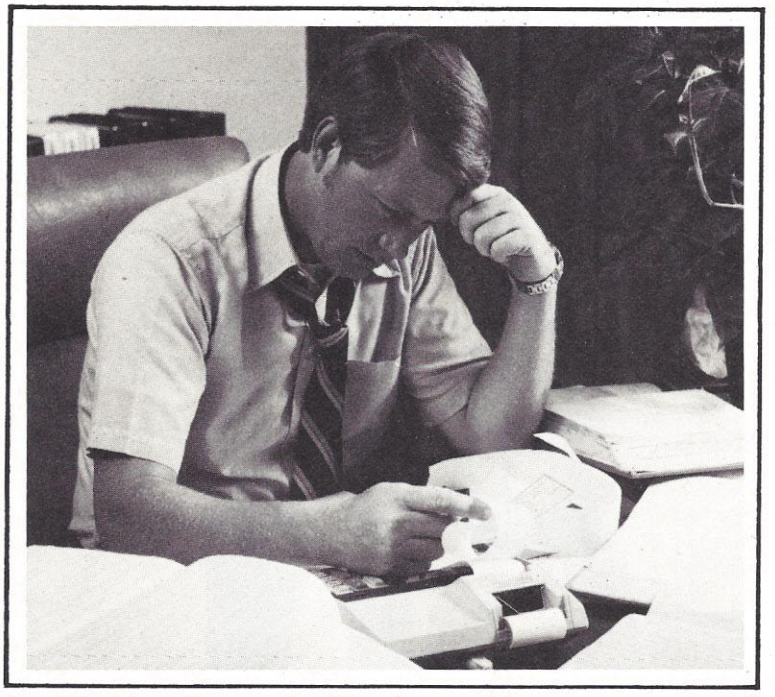

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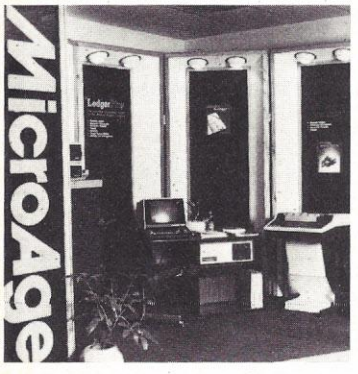

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CIRCLE 13

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surprised by Uhrenholdt's problems and frustrations. "There is a definite need for more services," he confirms, but hope is on the way. His own organization has a pilot project underway to create more programs for personal computers out of the approximately 80 programs that they have already developed for programmable calculators. And these programs are already used extensively by farmers.

Some of the problems are the fault of the farmers themselves, as Jolly sees it, and other problems can be attributed to the personal computer industry. "Farmers have a tendency to jump in at the cheapest level," with the result that they often end up with machines that can't really do what needs to be done. They often don't realize that "small farms are fairly complex businesses." The problems farmers face may be no different than those of other businessmen, but farmers follow relatively unique accounting procedures and have highly varied operations.

Still, "People are getting excited about personal computers," Jolly states. His own organization is running a computer conference for farmers in the near future. Other agricultural computer conferences have been springing up at all levels in recent months.

Agriculture via AGNET

AGNET, the University of Nebraska agricultural network, is one of the leaders of the farmer's movement into computers. Currently, about 150 farmers from seven states participate in the network, reports Patrick Ebmeier of AGNET.

The network offers a variety of programs which a subscriber can use. Some programs are primarily informational, giving the user access to a variety of data bases. Other programs are interactive, with the farmer providing specific data and the program delivering computed results.

FEEDMIX is the most popular of the AGNET programs. Farmers input the details of their current feed mix, and the program calculates the best balanced feed ration at the best price for the particular situation. Savings for farmers have been calculated by AGNET experts at $10-$15 per ton of feed for dairy operations.

Other programs calculate irrigation scheduling, crop budgeting, dairy budgeting, truck and tractor calculations, as well as commodity projections and financial programs.

Sowing soybeans

Gerald Schmidt uses his TRS-80 Model I to access the AGNET system. The Jansen, Neb., farmer works about 700 irrigated acres of corn and soybeans and 1500 head of cattle. He uses AGNET primarily for the data bases, such as commodity prices, and some of the particular operational programs such as crop and cattle budgeting.

Despite Schmidt's use of the computer for farming operations, 75 percent of his computer work, he estimates, goes into financial record keeping. The most noticeable difference from the days before he had the computer is that "now my records are ready to be looked at almost any time," says Schmidt.

He started with his personal computer a little over two years ago, and since then has added a disk drive and printer to the basic TRS-80 Model I.

Schmidt now writes most of the programs that he uses on the farm. He wrote the business software and a machine language word-processing program. And his business programs are very successful. "I wrote my programs to track physical transactions, not just the financial ones—sort of combining inventory control and accounting.

"When I started programming, there wasn't any software available," he recalls. With his cousin, a former computer engineer who has returned to farming, Schmidt went to work developing his own programs which "any farmer who keeps business like records could adopt." He also creates games and educational programs for his children.

What feed mix?

From AGNET, Schmidt takes some operational programs which draw on the data bases. Usually he would have trouble putting together such programs himself. For the cattle-feeding program, he inputs his own data and the program combines it with the cost and nutritional data in the AGNET files. The result is suggestions for the proper feed mixture. "It suggests alternatives that we would not have thought of. We could do it by hand, but that would be slow. It has changed the way we feed."

The big computer question now facing Schmidt is when to upgrade. "I'm looking for more power." With the guidance of his cousin, he is enjoying the prospect of shopping for a more powerful personal computer.

The computer has become a tool which helps Schmidt compete, particularly with the large feeders. "We need every advantage we can get," he states frankly.

Schmidt certainly isn't the only farmer who thinks that way. "Many small farmers are definitely interested in computers, especially for record keeping," says Francis Carlet, publisher of *New England Farmer*. As farmers watch personal computer costs come down and software become available, the computers grow more attractive. However, Carlet warns that, "Just because you own a computer, it won't automatically turn your operation around. The computer cannot manage or farm for you."

The farmers who are using personal computers agree. Like tractors and irrigation systems, a personal computer is a tool to help a farmer do his work more efficiently. Says Clara Thurston, "It is the best management tool we ever invested in."

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CIRCLE 18

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Balancing the books by computer

You no longer need shudder when the time comes to determine your financial position–not as long as you let your personal computer compile that data

PHOTO BY KENNETH W. SCHROERS

Preparing a balance sheet can make even an accountant shudder, especially at tax-preparation time. But whether the balance sheet is needed for a loan, a financial board meeting, an income-tax statement or a school assignment, a personal computer can ease those presentation worries by printing the document in an easy-to-understand, professional format.

Understanding some basic definitions before diving right in and running the balance-sheet program can ease the input process.

A balance sheet is comprehensive, but it's not complicated. Basically, it is a report of a company's financial position at a specified time—a summary of everything owned (assets), everything owed (liabilities), and the ownership (capital) of a business. The formula that expresses the balance is: Assets equals liabilities plus capital.

Using the program

The most time-consuming part of balance sheet preparation for a corporate or non-corporate business is compiling the data. The program won't directly help with that job, but the prompt messages will provide guidelines for you in totaling your books' separate accounts. The program output is structured to print a balance sheet in federal income-tax format (Forms 1065 for partnerships and 1120 for corporations).

To help you understand the program, two examples are given. One illustrates a corporate balance sheet and the other a non-corporate taxpayer's statement. Operation is the same for both types through the asset and liability sections.

The first question asked by the routine is the business' name. You may enter a two-line name by typing a comma after the first line entry. If your business has a one-line name, hit return after ?? and the program will adjust the printout for you. When entering the date, remember to enter day, month and year. Only one variable is dedicated to the date, so do not use a comma in the entry field or it will abbreviate the date.

Assets, liabilities

Most of the entries in the asset field are self-explanatory. When you get to LIST OTHER CURRENT ASSETS, the program allows the entry of category names for which no other provision has been made. The same freedom is offered later in the LIST OTHER ASSETS area.

For either of these asset fields, you may enter up to 10 categories and amounts. If you need more freedom,

a simple program change will provide greater category capacity. Should you have fewer than 10 new categories, type a comma and a zero to terminate the entry field. The blanks will be suppressed at printing time.

Where there are depreciable or depletable assets, the routine will ask for accumulated depreciation or depletion only if you entered a non-zero asset amount. For example, if there are no buildings on your balance sheet, there shouldn't be any accumulated depreciation for buildings on that balance sheet.

The definition of current liabilities parallels that of current assets. Anything falling due within one year is generally considered to be current (sales taxes collected but not yet paid, for example).

In the liabilities entry field, there are two categories allowing extra account entries. LIST OTHER CURRENT LIABILITIES and LIST OTHER LIABILITIES are treated like the corresponding entries in the assets area. Ten categories can be entered in each area as the program is written. Entry of a comma and a zero will force the program to the next entry.

Taking stock

When you've finished entering assets and liabilities, the routine will ask CORPORATION? Corporations have capital stock—partnerships and sole proprietorships do not. If the balance sheet is describing a corporation, you must input different data regarding the ownership than you would for another type of business organization.

The obvious difference in a corporate balance sheet is the entry for stock. Corporate ownership is represented by shares of stock, of which there are usually two classes—common and preferred. Enter the dollar amount assigned to the stock classes, not the number of shares. Most corporations set the par, or dollar value of their stock at the time of their organization. Par value is entered on the balance sheet without regard to present-day market quotations.

In some cases, corporations purchase their own shares on the open market. These shares are carried as treasury stock at the price paid—not par value.

A corporation may also have other money represented in the capital section of its balance sheet. A capital surplus is used to indicate that the owners (stockholders) have contributed money over and above the cost of shares to help the business. Appropriated, retained earnings are funds set aside from profits for specific purposes. Non-appropriated, retained earnings are profits that have not yet been earmarked for a certain project. A corporation must have made a profit at some time to have any retained earnings.

Balancing owed/owned

The program is structured to calculate the amount needed to balance assets with liabilities. If no capital surplus is entered, the program assumes that the entire excess is capital surplus. If a capital surplus is entered, the program will calculate the balance and put the excess capital in non-appropriated, retained earnings. This can be confusing if you are dealing with a corporation with retained earnings and no capital surplus. A simple program change will solve the problem.

For non-corporate balance sheets, the capital calculation is simple: Assets minus liabilities equal capital.

The routine then asks for the number of the desired output terminal. With the terminal selected, a PRESS "RETURN" TO PRINT allows a last look at paper-positioning and printer-enable switches before printing the balance sheet.

When the balance sheet is printed, the routine asks if you wish another copy. If your printer does not produce multiple copies, repeat the print sequence to make "carbons." A preview balance sheet can also be run on the video terminal before committing to hard copy.

Programming notes

This program is written in Applesoft BASIC. It is straightforward throughout, so you should find that it adapts to other BASICs readily. To keyboard the lines of code you'll need character-string variable, matrix-arithmetic capability and a bit of patience. If you only work with corporations, or if you never work with corporations, some lines can be omitted to ease the input task.

Line 70 dimensions the matrix variables for assets, liabilities, and stock entries.

"Preparing a balance sheet can make even an accountant shudder, especially at tax-preparation time. But a personal computer can ease those worries by printing the document in an easy-to-understand, professional format."

Data gathering begins in line 90 with the BUSINESS NAME entries. The asset data is collected in lines 110–560. Generally, this prompted input sequence is straightforward. The FOR/NEXT of lines 220–260 and lines 520–560 allow for entry of other asset categories and amounts. These categories will be printed at output time, along with the amounts. Line 250 terminates the prompt sequence when an asset has a "zero" indicated value.

In the collection of data on depletable/depreciable assets, lines

350, 380,420, 450, and 480 are used to bypass the entry opportunity for depletion or depreciation if the asset category is zero. (You can't really have accumulated depreciation on an asset if the asset doesn't exist.) Both the asset and its accumulated depreciation will be bypassed at printout time if the asset is zero, so the input jumps are for operator convenience.

Gather it up

Liability information is gathered in lines 580–760. The input routine is similar to the asset collection sequence. Two sequences (lines 630–670 and 720–760) allow input of liabilities for which no standard categories are included.

Until line 770, there is no difference in input for a sole proprietorship, a partnership or a corporation. However, the capital section of the balance sheet requires specific information about the business organization. Thus, the question in line 770 will steer the remaining data-collection effort and direct the latter part of the statement-printing routine.

Lines 860–890 provide for the selection of different output devices. If your BASIC has a different way of accomplishing this printer selection, the program must be altered.

The remaining BASIC is concerned with the statement printing. Statements 900–990 handle the statement heading. The TAB statements are used to calculate the spacing needed to center the business name and statement date on the form. The calculation is based on a 76-column-wide printing format, but it can be changed to fit another output device.

Assets are printed by lines 1000–1680. The TABs in this area are used to produce a justified right margin for the numeric entries.

The IF A(n)=0 statements in lines 1020, 1070, etc., are used to suppress the printing of asset categories for which no value has been entered. While the IF statements could be omitted, allowing the routine to print all of the zeros, the balance sheet looks more professional with only "real" categories included.

Lines 1630, 1640 and 1650 total the assets, less the appropriate depreciation or depletion. This straightforward input takes fewer lines than a FOR/NEXT loop.

Liabilities are printed by statements 1690–2000. The IF L(n)=0 commands echo the zero category suppression used in the assets printing routine. Since OTHER CURRENT LIABILITIES and OTHER LIABILITIES were totaled when the program was input, it isn't necessary to total them again.

Statement 1990 totals the liabilities and takes only one line of BASIC. Line 2000 prints the total.

In statement 2010, use the response to CORPORATION again. Capital (or ownership) is equal to assets minus liabilities (line 2020). Lines 2040 – 2090 finish the noncorporate balance sheet.

Print it out

Line 2100 includes four PRINT statements using the multiple statement-per-line feature of SWTP BASIC—the colon is the statement separator. Statement 2130 sends a form feed to the printer to set up for the next copy. There's no reason to include the four PRINTs if you're going to follow with a form feed.

Statement 2150 sends program control back to the video display to keep the ANOTHER COPY input off the balance sheet paper. A "Yes" response will recycle the printing routine back to the output-port selection. A "No" will end the program.

If you are dealing with a corporation, the steering statement in line 2010 will move program operation around the proprietorship CAPITAL/OWNERSHIP calculation and display. Corporate capital summaries are printed by lines 2190–2380.

Stock values are used in lines 2200–2240. If a value was indicated for "Paid In or Capital Surplus" at input time, line 2250 will step the program to print that value. If you did not indicate a capital surplus, the program assumes that the corporation has never made a profit and therefore has no retained earnings. Statement 2260 calculates capital surplus as the amount needed to balance the sheet—assets minus liabilities, capital stock, and treasury stock.

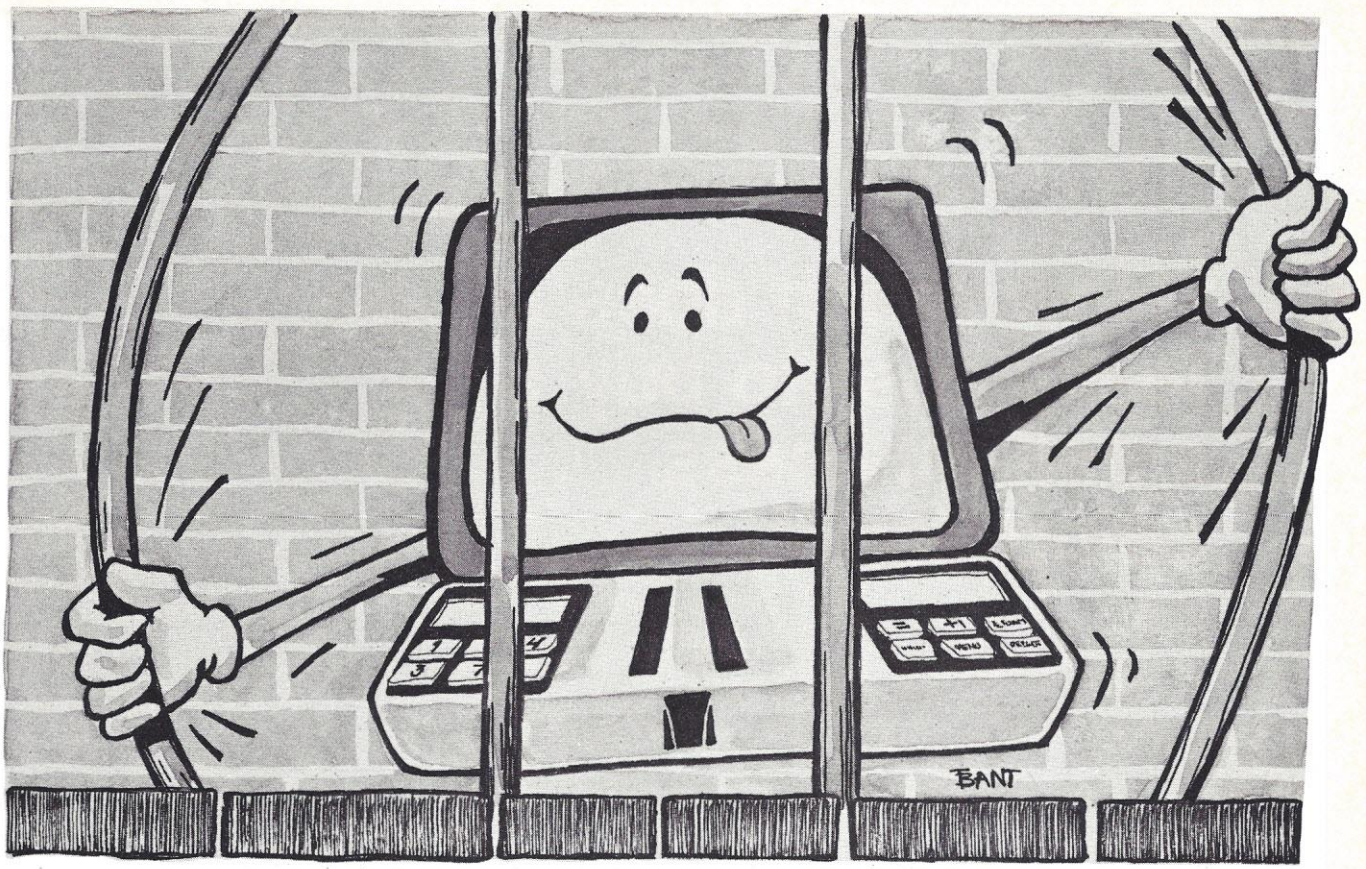
If, however, you entered a value for capital surplus, the program assumes that the corporation may have retained earnings. Any appropriated retained earnings (profits earmarked for a specific purpose by the corporate board of directors) are printed as entered.

Line 2300 calculates an interim value for capital, permitting line 2310 to determine unappropriated retained earnings. If line 2260 is executed, line 2300 will determine that "interim" capital is "true" capital, and 2310 will discover that there are no unappropriated retained earnings. Otherwise, the proper amount of unappropriated retained earnings will be put into variable S(6).

The final value of total capital is computed in line 2350 and printed in 2370. Statement 2380 jumps back to line 2060 to finish the balance sheet for the corporate business.

If you deal with any corporations that have retained profits but do not have capital surplus, delete line 2250 and change line 2260 to: IF S(4)=0 THEN 2280. The program will then put any unassigned balance into the unappropriated retained earnings account.

Editor's note: This program was originally written for an SWTP computer and was translated to Applesoft by the staff of Personal Computing. *continued on page 141*



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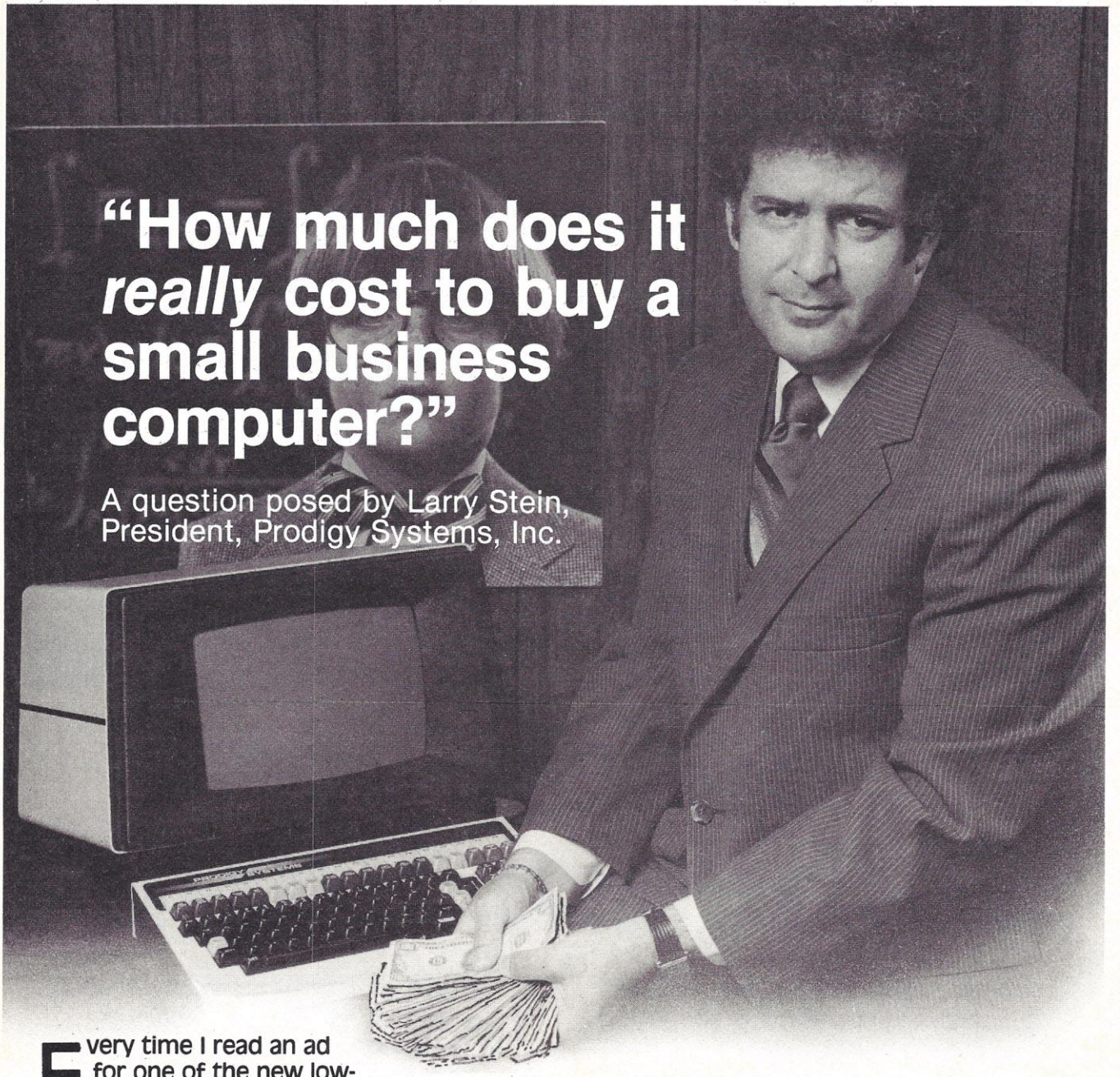

"How much does it *really* cost to buy a small business computer?"

A question posed by Larry Stein, President, Prodigy Systems, Inc.

Every time I read an ad for one of the new low-cost business computers, I cringe. Why? Because I see "respectable" manufacturers marketing computers like automobiles. They play games by advertising low prices, but they don't tell you about all the extras you have to add to make the system work. Especially the biggest extra of all — software. Without software a computer is worthless. Yet, most manufacturers like to keep the software issue hidden in the closet. Mostly because it adds considerable cost to their "low-priced" computers. But you can't talk about the cost of a computer without including the cost of software.

At Prodigy we think software is very important. That's why the base price of our computers includes our software (perhaps the best business software for small computers available today). We also include installation and training (at your location) — virtually everything needed to plug in and start operating. There are no hidden extras.

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PRODIGY SYSTEMS, INC.

CIRCLE 20

Zev Rattet

What do you call *your* computer?

There are "personal" computers and "small-business" computers, but is there really a difference between the two?

Personal computer. Small-business computer. Do you hem and haw when asked to distinguish between these two machines? Yes? Well don't feel alone. These ambiguous terms have confused many a computer literate.

The experience of three computer users may serve to illustrate just what makes one computer personal and the other small-business.

****

Bob Rothman, a San Francisco tax attorney, has practiced law for more than 10 years. Rothman was keenly aware of how many of his colleagues had bought computers for their offices in the last year. He didn't want to fall behind the times, so he recently bought one of his own.

Rothman had asked one of his more computer-literate friends for advice on what kind of system to buy. Since his main need was word processing, his friend recommended that Rothman buy a system with 64k of Random Access Memory (RAM); two disk drives with at least 240k of storage space each; and a letter-quality, high-speed printer. After shopping around, Rothman, with his friend's help, assembled a North Star system with two disk drives, a Soroc terminal and an NEC 5510 printer. He immediately put his secretary to work on the $9000 system.

But Rothman found it a bit difficult to give his secretary exclusive rights to the computer. He wanted to take a shot at it, so he taught himself word processing. That satisfied him for a few weeks.

Looking for a new challenge, he bought some more entertaining software to use with his new office machine. Soon he was using an astrology program, a Star Trek game, and others; then he found a home-budgeting program. Now he's studying a book on BASIC programming.

You can't help but ask, "What does this lawyer own? A moderately priced small-business computer or a very expensive personal computer?"

John Lewis was an insurance broker in Ohio. He had been exposed to large Hewlett-Packard and IBM computers that store, sort and handle large quantities of data.

Lewis found the information provided by these large mainframes useful, but he felt that a computer could do a great deal more to help him in his business. He unsuccessfully tried

> "If a computer is used by an individual, it is a personal computer, whether it's used in the home or in the office. A personal computer by any other name computes just the same."

to persuade the programmers in charge to write the kind of programs that he needed to make full use of the mainframes. What he needed, he decided, was his own personal computer and specialized software.

So, Lewis bought a TRS-80 Model I, and taught himself to program. He designed a variety of programs that more accurately fit his needs, and then moved to California to set up his own business.

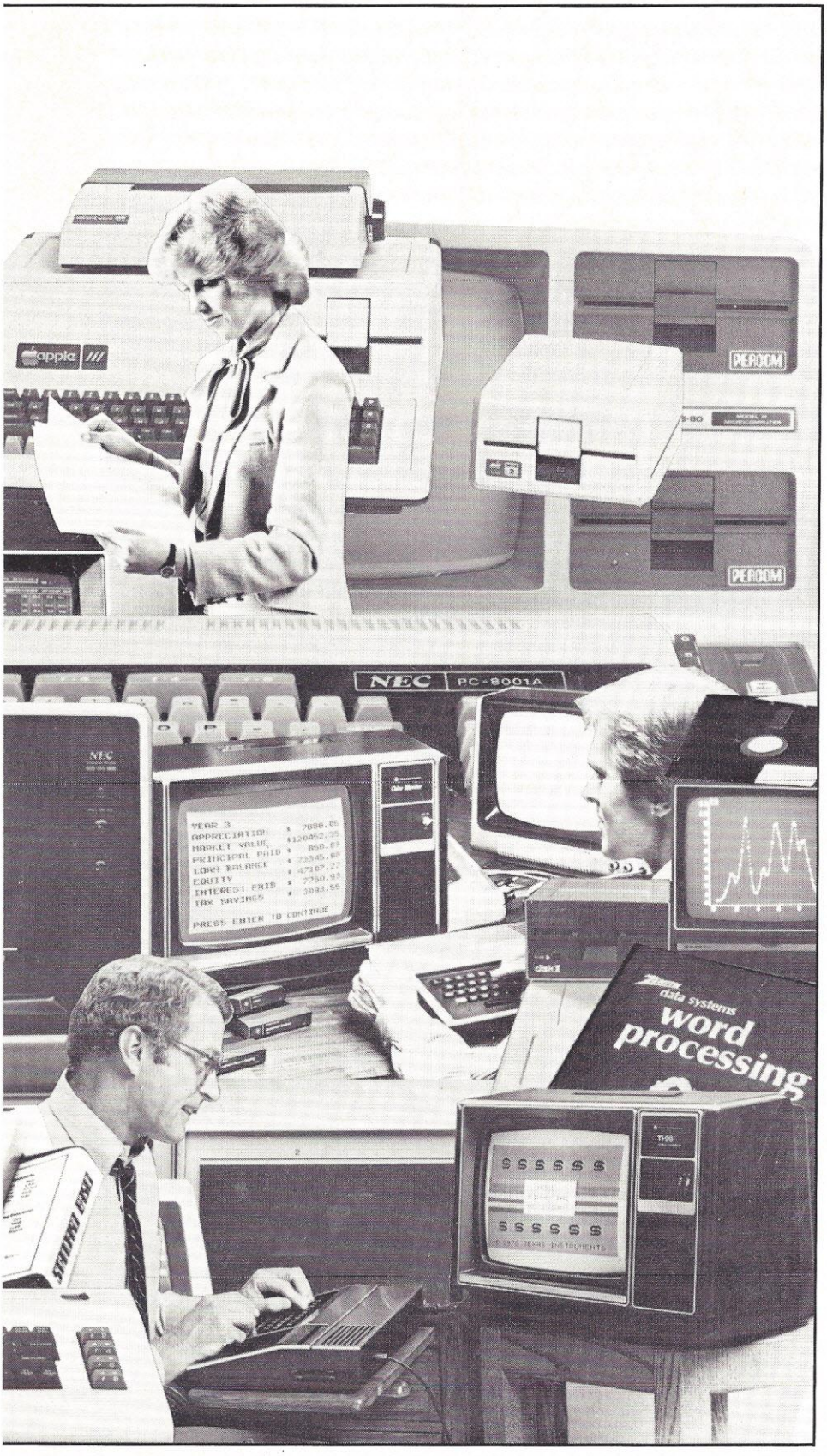
One of the first pieces of business equipment Lewis purchased was a new computer. The Model I was a good starter machine, but it had three physical limitations. First, it was a 6502 machine which made it slow. Second, it could only be upgraded to 48k of RAM and Lewis needed more to run his software. Finally, the amount of data that could be stored on each floppy disk was limited; he needed to have twice as much storage space. With these needs in mind, Lewis bought a TRS-80 Model II.

Although Lewis had written a great deal of his own software, he found there were some programs that he really needed to buy. He wanted word processing, so he bought CP/M and a word processor. He also bought general ledger software and a program similar to VisiCalc.

With these programs, Lewis has assembled an impressive small-business system that meets his needs admirably. But Lewis' needs are growing with his business. To meet these increased needs, he plans to upgrade to a hard disk.

A bite of Apple

Then there's Billy Frank Judis, who has spent the last eight years writing and developing training materials for the Army. Judis has worked on projects for a myriad of computerized command and control centers, such as the AN/TSQ-73 Missile Minder and the FAMAS meteorological station. The recent growth of the personal-computer in-



dustry didn't escape his attention. Finally, after six months of deliberation, he purchased an Apple.

Judis plugged his 32k system with a tape-storage device into his television set. He also purchased a computer game—one of those treasure-hunt-style games with hidden clues—and spent his first night glued to his new toy.

But Judis wanted to find more practical things to do with his computer, so he decided to use it to help him with his work. This would require some additional hardware and software, but he was convinced that by increasing his productivity he could make the investment pay off. Less than two weeks later, Judis had two new disk drives. He was still hooked up to his television, but he had added VisiCalc—his first business-oriented software.

Judis had acted with impressive speed. But what was even more impressive was that he had ordered an 80-column card, a Z80 card, a monitor, word-processing software and 16k more RAM. Judis had recently begun a fairly steady assignment with a new company and wanted to do a lot more of his work at home. His co-workers told him that if he wrote on his Apple at home, they could download his disks into the mainframe at work. So he ordered the additional equipment.

In less than a month, Judis paid for his entire computer system. What had started out as a home personal computer for playing games and amateur programming had turned into a $4000 small-business computer system.

What, then, is the difference between a small-business and a personal computer?

Until this summer the question was easily answered: Apple, Radio Shack and Commodore were personal computers; North Star, Altos, Cromemco, and Vector were small-business computers. Why? Basically,

they were distinguished by size and price.

Personal computers could be bought with as little as 16k of RAM and a simple tape-storage device. Anyone with an interest in learning about computers could afford to make an investment of a few hundred dollars and find out just how deep their interest was. The computer hobbyist could buy a "starter set" and build a system. Within a fairly short time the "starter set" with 16k of RAM and a tape-storage device was hooked up to a television, and became a 48k machine with two disk drives and a monitor. But even when expanded in this fashion, the price was inexpensive.

The small-business buyer, on the other hand, has never had a use for this type of system. There is simply not enough RAM or disk-storage space in such a configuration to perform virtually any business application. A businessman doesn't buy a computer to play with—he buys it for business, for the money it can generate or save.

So the business buyer hired a computer consultant who assembled a system for him; 64k of RAM; a letter-quality printer; two disk drives; maybe even a hard disk if his disk-storage needs were that great. Before long, he had spent $12,000 on hardware, a thousand or so on software, a few thousand on the consultant and possibly a few thousand more training his staff to use the new equipment. All of this had to be justified by the money that computerization would save.

Prices falling fast

But the cost of a similar small-business system has plumeted in the last few months. What had been a $12,000 system can now be assembled for $6000 to $8000. As a result, the number of businesses that can now afford to computerize has increased astronomically. What's more, those companies that traditionally zeroed in on the home personal-computer market have redirected their advertising to the more lucrative small-business marketplace. For instance, the new Apple ads starring Dick Cavett are clearly aimed at the businessman, not the hobbyist.

To confuse matters more, Xerox, one of the world's largest office-products suppliers, has entered the fray with a small-business computer that comes with a standard 64k of RAM and costs less than $3000 (without a printer). This is less than what is costs to assemble an Apple system with two disk drives, a Z80 card, a monitor, and 48k of RAM.

> "What is the difference between a personal computer and a small-business computer? None"

All in the software

So what *is* the difference between a personal computer and a small-business computer?

A computer is neither a personal nor business computer when it is built. A computer is what it does. What you call it depends on the use to which you put it; more specifically, it depends on the software you use with it. Some say that if you buy business software, you have a business computer. And if you buy personal software, you have a personal computer.

Xerox, NEC, Sharpe, Toshiba, BMC, Hitachi, and now IBM have announced new personal computers. They all want their share of the business that to date has been dominated by Apple, Tandy and Commodore.

Some of these companies are marketing their hardware as small-business computers. Each of these new machines comes equipped with a CP/M operating system (or soon will). Xerox even offers CP/M as the standard operating system on its new 820. These companies understand that it is business software that makes a computer a business system.

Why CP/M?

CP/M has become the common denominator that links all Z80 and Z80-like microprocessors on the market. By working in CP/M, programmers afford themselves the broadest possible market base for selling their software. Without a large sales base it would be difficult, if not impossible, to recoup the enormous initial investment that's required to develop business software. After all, business software must be very good—both useful and usable. The small-businessman is an unforgiving consumer who cannot afford to run "buggy," imperfect, or difficult-to-use software.

If you want to program and play games, a number of operating systems will do: Apple DOS (Disk Operating System), NEC DOS, or many of the 6502 or Z80 operating systems. But if you want to use your computer as a business system, you want a computer that will run CP/M software.

So the answer to that nagging question is: "none." There is no difference between a personal computer and a small-business computer. Keep adding peripherals and memory and any personal computer grows in power, but it basically doesn't change.

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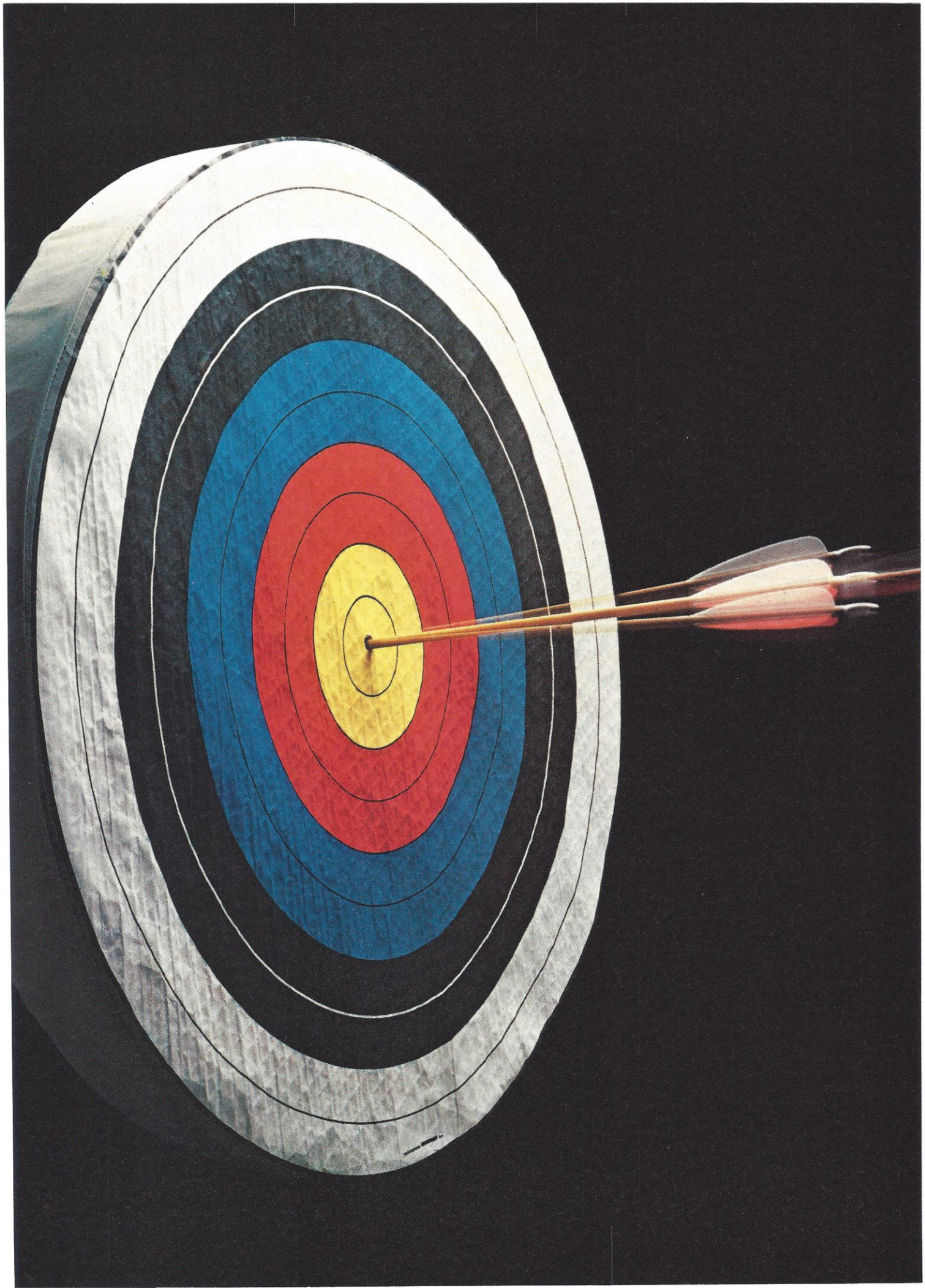

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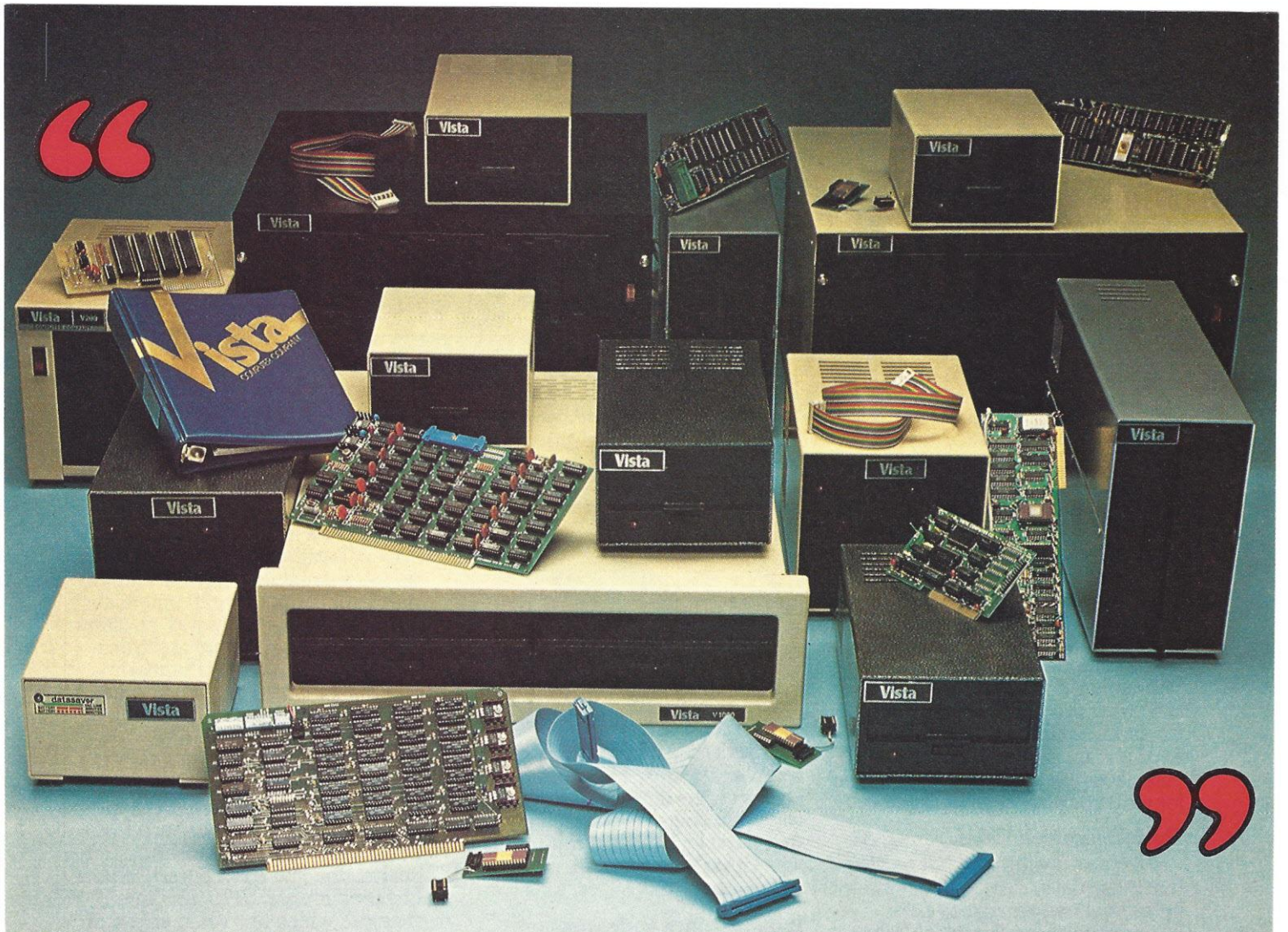

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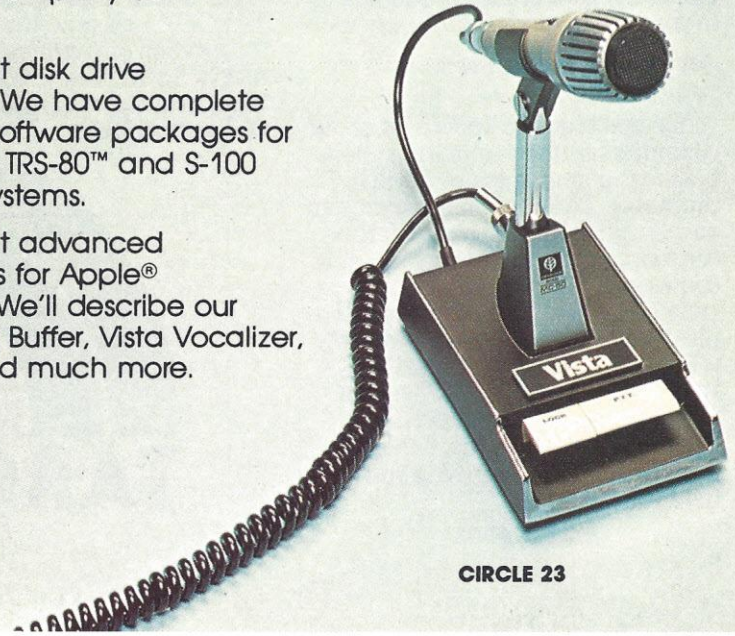

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CIRCLE 23

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Phil Nowes

Engineering testing made easy

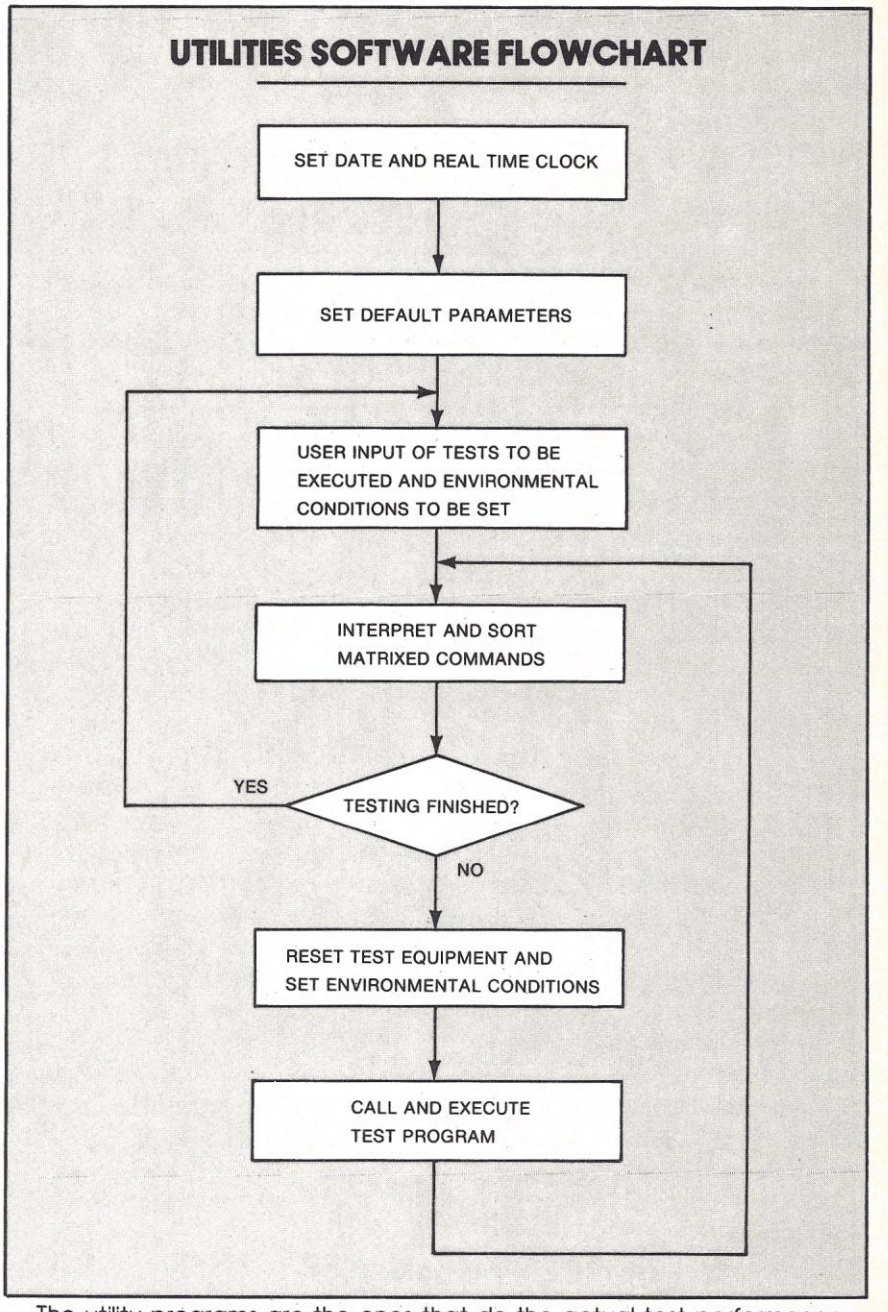
Personal computers can take away much of the drudgery in many technical jobs. But careful attention has to be paid to the design of the total computer system

When radio equipment is sold into the international marketplace, the testing requirements imposed by the country in which the equipment will be used can become a headache for the manufacturer. That used to be the case for Motorola's Communications Sector in Schaumburg, Ill.

To alleviate these testing headaches, the engineers at Motorola have installed and programmed an automatic-test system based on the HP-85 personal computer. As a result, testing time has been reduced from 32 days to about four or five. And that time is mostly spent evaluating the data generated by the test system, not in actual test time. The physical testing is accomplished overnight.

This overnight physical testing has also reaped a side benefit. The inordinately long time it used to take for the testing caused a certain amount of boredom among the test engineers. Since test time has decreased, employee morale has greatly improved.

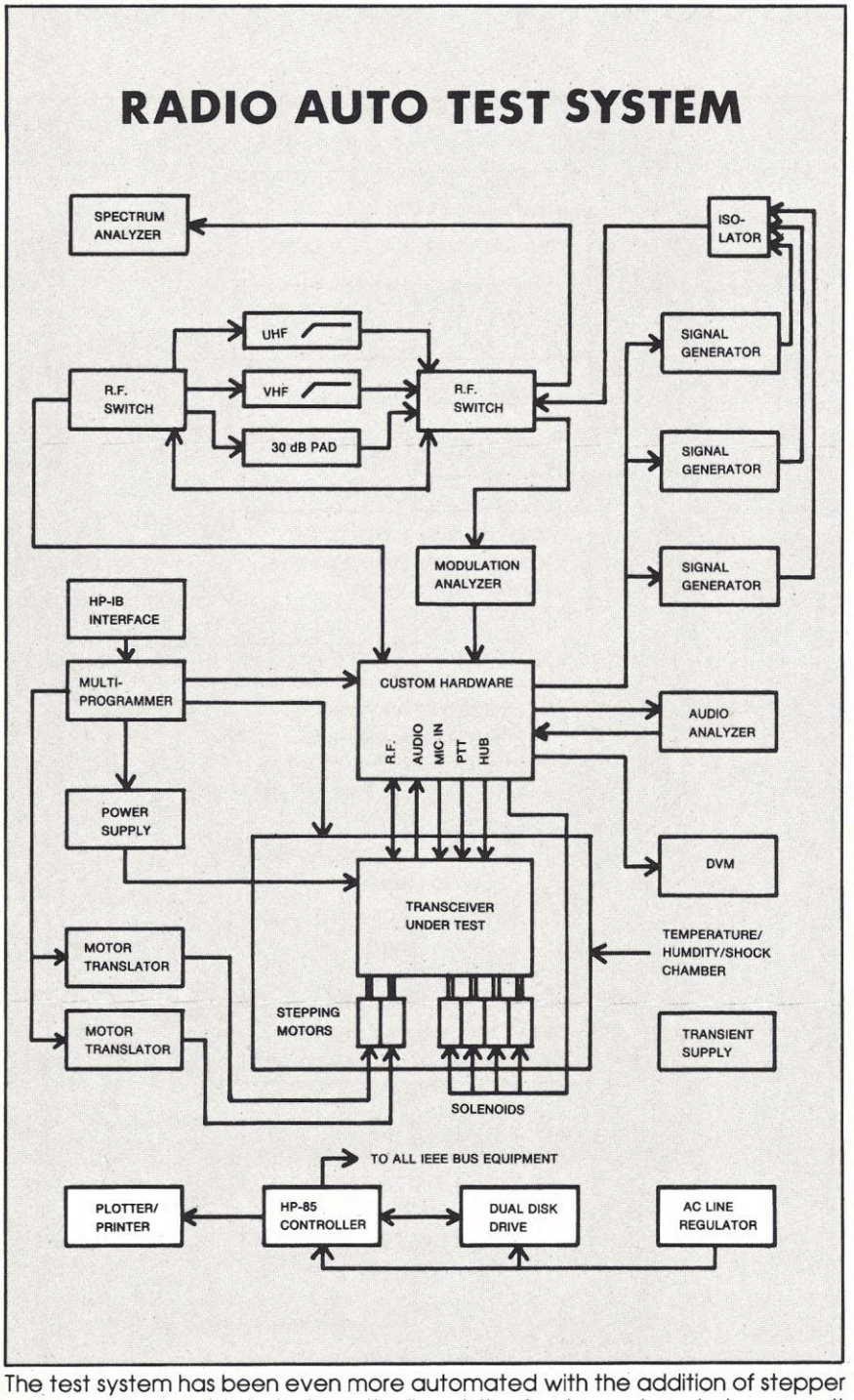
These benefits have been accomplished by careful system design and specification. Motorola's engineers



The utility programs are the ones that do the actual test performance. The matrixed commands are different for each particular radio and country in question.

first considered the task the computer was to perform, defined the hardware and software required for its execution, and then proceeded to assemble the system.

The basic equipment testing comprises two categories—transmitter testing and receiver testing. Transmitter tests include: power out, frequency stability, conductive spurious emissions, harmonic levels and distortion, hum and noise and others. Receiver testing covers: sensitivity, adajacent-channel sensitivity, spurious response, rejection, intermodulation response, rf blocking and bandwidth.



The test system has been even more automated with the addition of stepper motors and solenoids to automatically set the front-panel controls on a unit under test.

More testing needed

Equipment reaction to temperature, humidity and shock must also be tested and evaluated. To complicate matters further, each piece of communication equipment must be tested individually with a customized evaluation technique that meets the standards set by the country to which the radio is shipped.

A radio must be tested and evaluated before it's offered for sale. The radio is then submitted, with the proper forms and evaluation results, to a governmental agency (similar to the U.S.'s F.C.C.) for clearance.

Motorola's engineers wanted to be able to do about 100 tests on a given radio for a country governmental filing. But the designers also wanted the test engineers to be able to do just one test on one radio, or four tests on several radios. And some tests, like frequency response, may cover 10 or 20 data points, and then measure each of these points at three or four temperatures, three voltages, and different humidities.

This maze of tests used to take 32 days to accomplish (18 to 30 days when everything checked out correctly the first time). And that timetable covered only one piece of equipment. But often an engineer would isolate a problem—which could have been anything from a defective part to a poor solder connection—after the radio had already been under test for a week or two. After the defect had been fixed, the entire test sequence had to start from the beginning to ensure that correcting the defect hadn't adversely affected other test parameters. The boredom that this

repetitive test loop caused was a principal target of the automatic system.

Getting it together

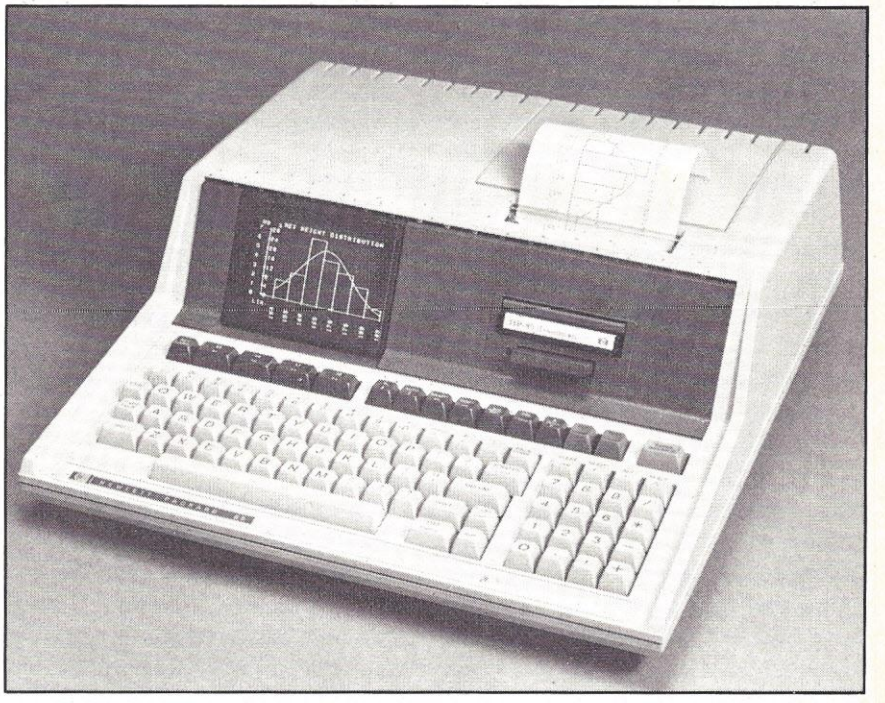
The first step in automating the testing system was the procurement of approximately $150,000 worth of computer-controlled test equipment. This included a signal generator, a spectrum analyzer, a modulation analyzer, digital volt meters and other equipment. An additional $13,000 was spent acquiring the HP-85 with two $5\frac{1}{4}$-inch floppy-disk drives, a 7245 printer/plotter, an IEEE-488 bus interface, a ROM drawer with an I/O ROM, a mass-storage ROM (to talk to the disks), and a printer/plotter ROM.

The HP-85 was selected over the larger HP-9825 for programming and cost reasons. The engineers at Motorola (who did all of the programming), were already skilled in BASIC and felt comfortable with the enhanced BASIC of the 85. Also, they were not familiar with HPL, the language required for the 9825. (HPL is a derivative of APL.) Finally, in weighing the two systems, the 85 was less expensive.

The HP-85 was also chosen over other manufacturer's systems, such as the Commodore PET computer, because of the interface compatibility of the HP unit. The engineers tried programming a PET for the testing job, but found at least one case in which the PET had difficulty controlling an available HP signal generator. Using an HP computer obviated this difficulty.

Motorola's engineers also looked closely at the HP-9826, and an IEEE-488 bus controller from John Fluke, a test equipment manufacturer. In comparison, the HP-85 seemed most capable of doing the required testing.

The HP-85 was chosen, therefore, for a combination of reasons—low cost, in-house knowledge of BASIC (eliminating the need to hire a special programmer), and greater compatibility with the majority of previously purchased HP equipment, which simplified trouble-shooting.



The HP-85 computer is the basis of an automated radio-test system that has decreased test time for Motorola significantly. In the process, it has freed employees from dull and repetitious work.

Flexibility

The software had to be designed to allow the system maximum flexibility. The general principal used was the development of modular software, in which each test to be performed was written as a separate program.

The software is divided into two major categories—the main program, which coordinates all the testing activity, and the utility programs, which handle the separate test chores. Users can select the tests they want run by entering test parameters to be acted upon by the main program, which runs the programs that are specified.

The tests are numbered from one to 20, and each of the specific countries (and their required test parameters) are numbered from 1 to 10. In this way, the countries in which a particular radio will be used, and the tests to be run on that gear, can be entered into a matrix. From this matrix the master program can select the test programs to run.

From one aspect this modularity is good, in that it allows a great deal of flexibility in the selection of tests to be run on a particular piece of equipment. But it's inconvenient because of the time required to run a test. The 32k memory-size limit on the HP-85 means that most of the utility programs have to be stored on a disk. Thus, when the main program calls for a test program, the test has to be loaded into main memory before it can be executed. This adds overhead time to the time required for a particular test, and the overhead may be significant. When each test is completed, the equipment must be reset to keep it from being left in an im-

proper state. The main program must determine the next test to be run, set test parameters and access the disk. That can take as much as a minute before the commencement of a ten-second test.

Other capabilities

The programs produce exact test measurements, and can perform very tedious, repetitive tests. The result is that some tests that were impractical to perform manually can now be done.

Typically, in a manual test, an engineer would take noise and hum measurments with an analog meter, which has two major limitations. Every analog meter has a margin for error, and each engineer has his own way of reading a meter, and then averaging the readings in his head. Thus, two engineers performing the identical test on a piece of equipment often report different results. With the new system, however, repeatable results are assured, and a 95 percent confidence limit is attained in a series of test results.

Although it takes four or five days to evaluate the data gathered from the testing, 75 percent of the total testing has been eliminated. And evaluation time will also be reduced when additional floppy-disk drives are connected to the system. These drives will allow data to be stored on the disks, which is impossible now, because the testing programs use all of the available disk space.

Analysis, too

The establishment of this data base will also allow the computer to analyze some of the data that are now sent directly to the printer because there is no disk storage room available. The analysis capability will allow the test engineers to measure trends, rather than just pass-fail results. For example, the variation of a harmonic with change in temperature can be determined.

"It clucked like a mother hen. . .then these things popped out."

In addition to analyzing data, the HP system also helps decrease the amount of raw data using the 7245 printer/plotter. Also, many of the test results are output in graphic form. For a frequency response curve, for example, a box that shows the maximum and minimum limit is plotted. The response line has to fall within that box, and the engineers can quickly tell whether or not the radio is performing properly.

The next logical step will be to superimpose a number of graphs with voltage variation (or temperature) on the frequency response curve; and Motorola is now working on that capability.

In addition to the man-hour savings, the hardware (about $150,000 to $160,000 was invested in the setup) has paid for itself in just the first six months; and that doesn't include intangible benefits like getting the product to the marketplace earlier. It just represents man hours and effort that would have been expanded in doing the test manually. The system has freed two or three engineer's time, so that they can move on to other projects, and repair faults in radios that have been tested.

Speed and variety

Additional equipment is now on the horizon, which will enable a wider variety of tests and faster evaluations to be made.

One of the expansion-system possibilities Motorola engineers are considering is the HP-9845 data-base management system. This will probably end up costing in the neighborhood of $40,000 (slightly more than the original $13,000 invested in the smaller system), but will allow Motorola to add some functions and self-test programs to the setup. The engineers would eventually like to get to the point where the system will do all of the data analysis, and speed up some of the testing.

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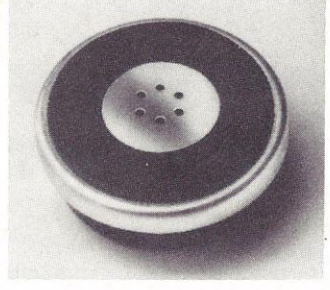

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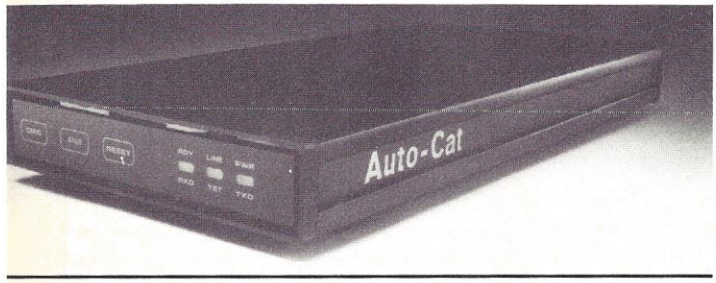

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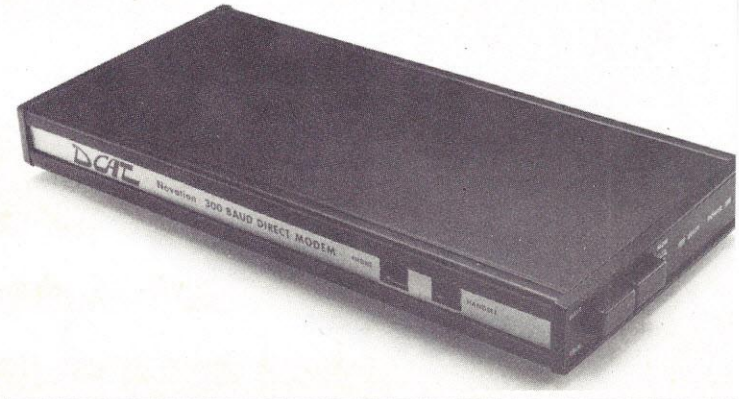

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ADVANCED COMPUTING

Format your inputs, the natural way

Program input doesn't have to be an eyestraining task; page formats allow the operator to keep track of input and make corrections as he goes

All computer programs have one element in common: program input. Games, utilities and data-base programs all require operator input in one form or another. This presents a potential problem to both operator and programmer alike: What method should be used to prompt the operator input?

A well-structured input can be a panacea for programs involving many data inputs. On the other hand, a poorly formatted input can be an anathema for the operator, because it isn't tabulated as it would be if done manually or on a typewriter. But input techniques that simulate tabulation formats have been used in the preparation of programs intended for use by a novice operator. These formatted page inputs have resulted in more accurate data entry, and since most of us have been trained to write data in tabular form, it seems only natural to input data in a similar manner.

Various input methods applicable to most BASIC programs are presented below. Although the program listings are written in Microsoft Level II BASIC (Z80 based), the techniques presented can be adapted to other versions of BASIC.

Most commercial software for personal computers incorporates one of the more conventional input formats requiring use of either the ENTER key (or equivalent) or the spacebar. The first causes the display to scroll; the latter, if properly done, does not.

Scrolling input is seldom a problem in game programs, since the entire display changes as a result of the input. It can be a problem if the information displayed is to be retained on the video screen for reference. In this case, the INKEY$ form of input is used to inhibit scrolling. Thus, the programmer's choice between the two input techniques is dependent

```
ADD A RECORD:
 RECORD # 1
  1. NAME            : JOHN J. SMITH
  2. ADDRESS         : 123 ELM STREET
  3. CITY, STATE     : ELMHURST, IA
  4. ZIP CODE        : 48000
 RECORD # 2
  1. NAME            : HENRY K. HANKS
  2. ADDRESS         : 111 ANY STREET
  3. CITY, STATE     : GROVEVILLE, IA
  4. ZIP CODE        : 48051
 RECORD # 3
  1. NAME            : MARY E. MARKUS
  2. ADDRESS         : 1010 W. CITY ST.
  3. CITY, STATE     : HANKSVILLE, IL
  4. ZIP CODE        : 50511
```

Figure 1. Typical data-base program input style

upon the program application.

Inputting large amounts of data in a data-base program is, at best, tedious. Several good data-base programs follow the input style most commonly employed by the programmer. Although these programs offer many fine features, the typical input format, displayed in figure 1, can tax the memory of the user.

In a typical data-base program input style, all data are input as separate line items. As the operator inputs data in response to the prompt, the display scrolls upward. While this approach is the simplest in program development, the operator is literally blind as to what data has already been input. The user must depend on a scratchpad to keep track of the data as it is being entered. Only after all data are entered can the operator display the input to check format and accuracy.

Page-type input display, shown in figure 2, solves the visibility problem. Data are displayed in the appropriate line and column as they are input, with the completed entry constituting one record. The operator is always aware of what has been input. This format can be structured to allow immediate correction of an erroneous input. In fact, the programmer has two choices in providing a correction mode: A correction prompt may be provided after entering all data for an individual record, or only after several records have been entered. In either case, data input may be continued until near full capacity of the screen is used. This full screen of data is called a "page."

The programming technique for page-type input is presented in listing 1. Note the use of the PRINT @ instruction to position the prompt for column entries. When PRINT @ is used in this fashion for a conventional input, scrolling of the display is inhibited when data are entered. Thus, the input can be displayed in proper format, and is retained for reference as the input cycle continues.

Variable G is used in listing 1 to designate the PRINT @ location. After the initial input, G is incremented as necessary to place the next input prompt at the desired column locations. This function is continued throughout the input cycle until all entries for that page have been completed.

Variable L is used as a line counter, being increased by 1 upon completion of all entries for that line. When the line count equals a predetermined value (see line 200 of listing 1) the program branches to line 300. At this point, after response to the correction prompt, the data display is erased, leaving the header intact. Variable L is reset to ϕ value for the beginning of a new page count, and variable G is reset to the original PRINT @ value. The program flow is then directed back ot the input cycle in preparation for the next page of data input. An escape code, as the first data entry, provides an exit from the input cycle and returns program control to the menu.

The page format

The page format poses no problem as long as the number of columns does not crowd the space available on the video screen; however, if the number of columns is increased to occupy the entire screen width, the visible prompt ("?" in this example) can become a problem. Legibility is lost as a result, and one or more columns must be sacrificed to retain space for the data inputs.

With the TRS-80, the INKEY$ function may be used to input data in a multi-column page format. This function provides the advantage of a

```
TYPE/ENTER INFORMATION AT '?' PROMPT (USE NO COMMAS), OR
WORD 'END' AT NAME PROMPT TO EXIT THE INPUT CYCLE.
-------------------------------------------------------------
RCD/NAME              ADDRESS          CITY          STATE-ZIP
-------------------------------------------------------------
1 ?JOHN J. SMITH      ?123 ELM ST.     ?ELMHURST     ?IA  48001
2 ?HENRY K. HANKS     ?111 ANY ST.     ?GROVEVILLE   ?IA  48051
3 ?MARY E. MARKUS     ?1010 W. CITY ST ?HANKSVILLE   ?IL  48900
4 ?JACK C. RIGHT      ?5454 TEMPLE ST. ?WESTRIDGE    ?TX  57001
5 ?MARK C. ANDERSON   ?4321 MAGNOLIA   ?WEST BEACH   ?FL  34000


TYPE/ENTER 1 TO CORRECT AN ENTRY, ELSE 0 => ? 0
```

Figure 2. Formatted data-base input display

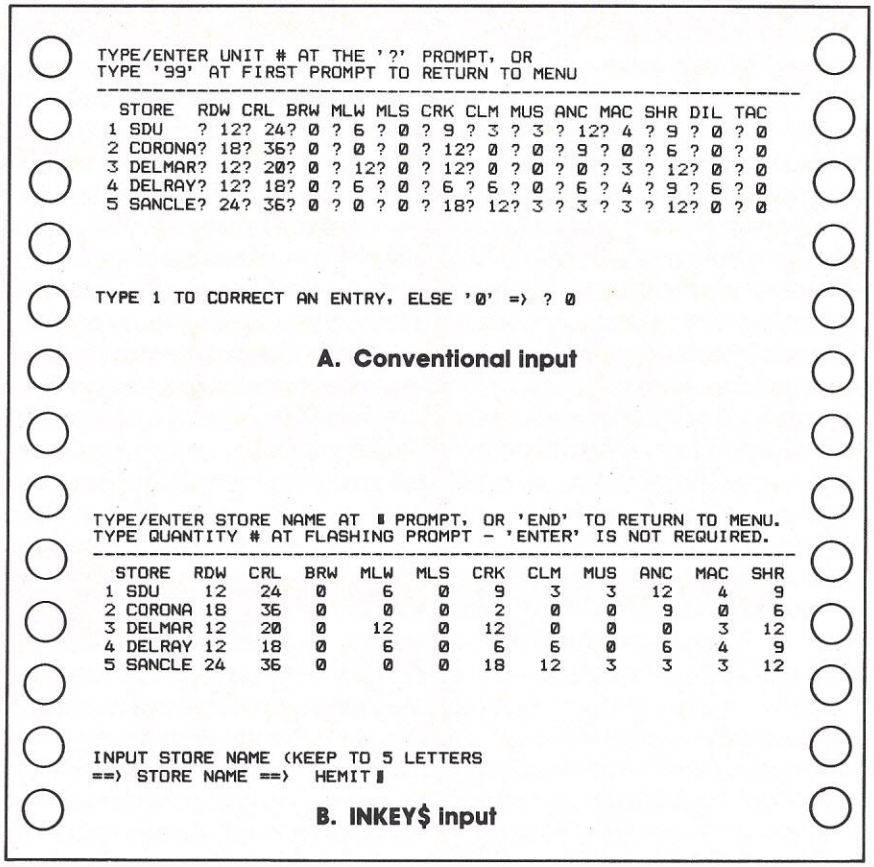

Figure 3. Multi-column input comparison

non-scrolling input plus elimination of the conventional prompt symbol. A typical display page format is illustrated in figure 3. Due to the many columns crowded into a 64-character screen format, it was not possible to use the standard INPUT function in this case without destroying legibility of the data entries. Use of the INKEY$ function not only solved the problem of legibility, but also reduced the number of ENTER keystrokes required to input data.

Major program elements for the multi-column format are provided in listing 2. Note that the input cycle is virtually identical to that of listing 1. Both the PRINT @ technique (variable G) and line counter (variable L) are retained. The major differences are the inclusion of a GOSUB statement followed by a transfer of input values to a subscripted variable (for example B(E) = VAL(ZY$)).

The key to the input format is the GOSUB routine beginning at line 9200. The subsequent program lines provide two major elements; a flashing cursor and a maximum two-digit entry. In use, a flashing cursor appears at the beginning of the first column entry location. Upon pressing a number key, the number appears in the space occupied by the cursor as the cursor moves one space to the right. As a second number key is pressed, the number is printed on the screen and the cursor automatically jumps to the beginning of the next column, awaiting a keyboard input. In this case it is not necessary to use either the ENTER key or spacebar to advance the cursor.

But what happens if there is no entry, or only a single-digit entry is to be made in a particular column? No problem; pressing the spacebar twice is equivalent to a zero value entry, and causes the cursor to advance to the next column. Typing a single number and hitting the spacebar advances the cursor for a single-digit entry.

The subroutine beginning at line 9200 contains INKEY$, a string function. A numeric value entered in response to the prompt is stored as a string. Under a single INKEY$ entry format, program flow would normally be returned to the main program when a key is depressed. However, since this particular program entails both single- and double-digit entries, the first keyboard input is stored as variable Z1$, and the program reverts back to the flashing-cursor routine. In this case, depressing either a key or the spacebar sends the program to line 9240, where the entry is stored as variable Z2$. At this point the two entries (Z1$ and Z2$) are linked together for temporary storage as ZY$, and the program is returned to the calling point.

Since the digits entered as a string must be stored and used as integers, they must be converted accordingly. This is accomplished by using the VAL(ZY$) function in conjunction with the subscripted variable used for integer storage (for example B(E) = VAL (ZY$)). Due to the nature of this particular program, this "swap" must be included in each input line (see listing 2, lines 112–118).

A different approach

Another approach is advantageous for programs that categorize data according to a code reference number. In a check record program—a typical example of this type of program—expenditures are broken down into a dozen or more categories, and each is represented by a code number. The code number serves to identify the related data entered to create the file record for each check. Thus, a code number is entered in response to the CODE? prompt, which precedes each new record input.

The use of code numbers, in lieu of names of acronyms, to designate a particular category reduces memory requirements. It also simplifies development of the sort and search recall routines; however, the code adds one more chore to the data-input task. Whether the code number assignment is done before or during the data-input cycle, it requires the use of a code-reference sheet—just one more piece of paper to crowd the workspace.

The data-input problem can be simplified by combining the code-reference list with the data input on one video screen, as shown in figure 4. This format provides a ready code reference for the operator. The input header eliminates the need to repeat input name prompts. By using a typist's copy easel next to the video monitor, the operator need only glance from the screen to the easel when inputting data.

During the input cycle, only the data input line is erased after all line prompts have been answered. The code-reference table and input-header display remain intact. The next entry is prompted by the next record line number.

Nobody's perfect

While computers may be infallible, operators are not. The person who can enter more than a dozen pieces of data without error is the exception. Therefore, the wise programmer will make provisions for correcting entries before filing the records to tape, disk or hard copy.

In the examples shown, the data are input as one-line items. Upon completion of the entries, the operator is given the choice of correcting the entry before continuing on to the next. If the operator elects to change the entry line, the displayed entries are erased and the same line (or record) number is again displayed to prompt a revised line of data entries. The new data-input cycle is begun only when the operator provides a negative response (typing a "ϕ" in this example) to the correction prompt. A typical correction sequence is provided in lines 2500–2520 of listing 2.

The number of data-entry lines that are input before branching to the correction routine may, at the programmer's option, be increased if screen space permits. If the last line on the screen is used for the correction prompt, it will be necessary to use a non-scrolling input to preserve the screen display. An INKEY$ (or equivalent) input would serve this purpose.

Both the standard INPUT- and the INKEY$-type instructions are frequently used in the same program. To facilitate use of the program by any operator, the programmer must include an appropriate instruction in the prompting message. For example, the words "TYPE/ENTER. . . ." have been used in the figure 3 display to indicate the need to enter the information after it is typed. A continuation prompt such as "PRESS=SPACEBAR=TO CONTINUE" would be used for an INKEY$-type response.

To add a professional appearance to your prompts, try using solid and flashing cursors for the input prompts. The solid cursor prompt shown in figure 3 serves to indicate a standard INPUT-type entry. In use, the cursor moves to the right as information is typed from the keyboard and displayed on the screen. Pressing the ENTER key commits the information to memory.

The flashing cursor can be used in conjunction with prompts requiring keystroke-only entries. In this case, the prompt is programmed so that striking a particular key will cause program continuation without the need to hit the ENTER key. The flashing cursor not only adds a professional touch to the screen display, but is a reminder to the operator that the computer is waiting for an operator response.

The solid- and flashing-cursor subroutines are provided in listing 3. Either routine may be called up via the GOSUB statement as required. Listing 3 includes a sample demonstration routine that illustrates application of the cursor subroutines to a particular program prompt. Almost any graphic or keyboard symbol may be used for the cursor by inserting the appropriate ASCII code in lines 9010 and 9100 (replacing CHR$(140)and CHR$(138)) of listing 3.

Setting limits

It is sometimes advantageous to add a delimiter to the input subroutine to control the number of characters that can be input. Typing the zip code in mailing-list entries is a typical example of this application: Use of a delimiter forces the operator to type exactly five characters.

This program technique is presented in listing 4. In this example, variable Y serves as a delimiter, establishing the number of characters that must be typed. Until this number of characters is typed, the computer will refuse to continue program execution. Upon typing Y-value characters, program execution continues, and any characters in excess of the Y value are ignored.

When used in a main program line, delimiter Y may be set to any value desired. For example, if used in a mailing list program, it could be set to a value of 2 (i.e., Y=2) for the STATE entry. This would limit the abbreviation to two letters, in accordance with postal abbreviations. Likewise, in the zipcode input line, including Y=5 would ensure that a five-digit entry was typed.

continued on page 142

Editor's note: Turn to page 94 for further information on easy input.

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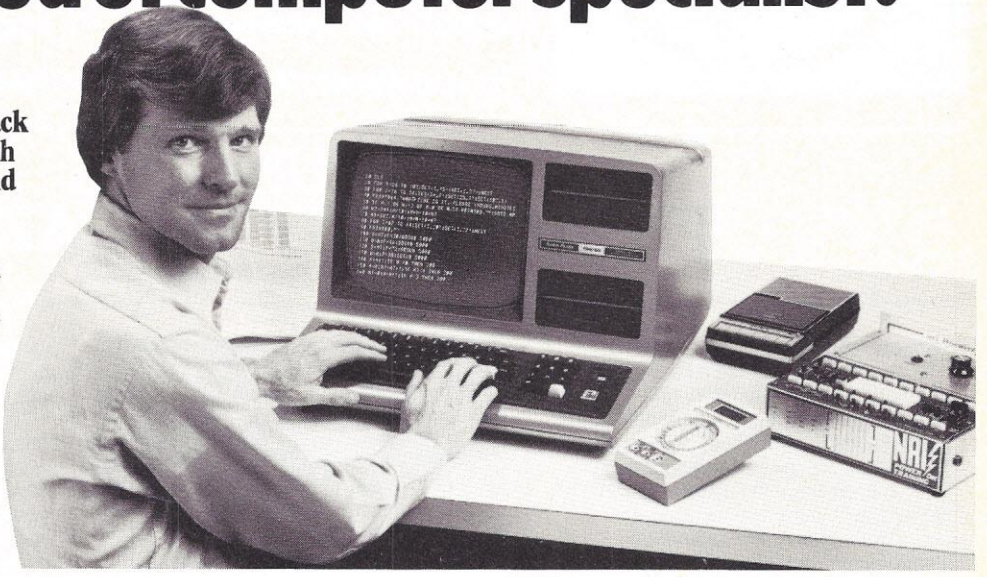

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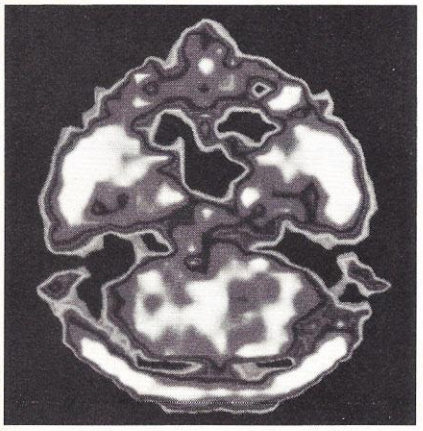

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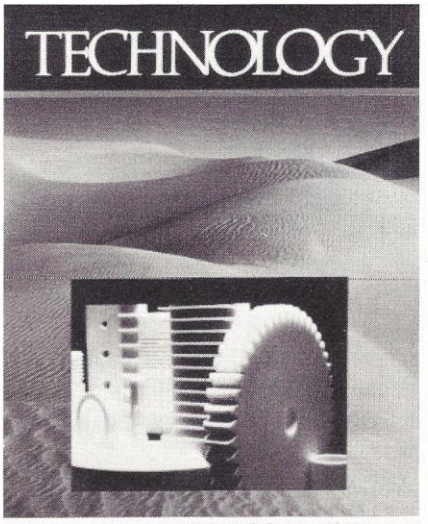

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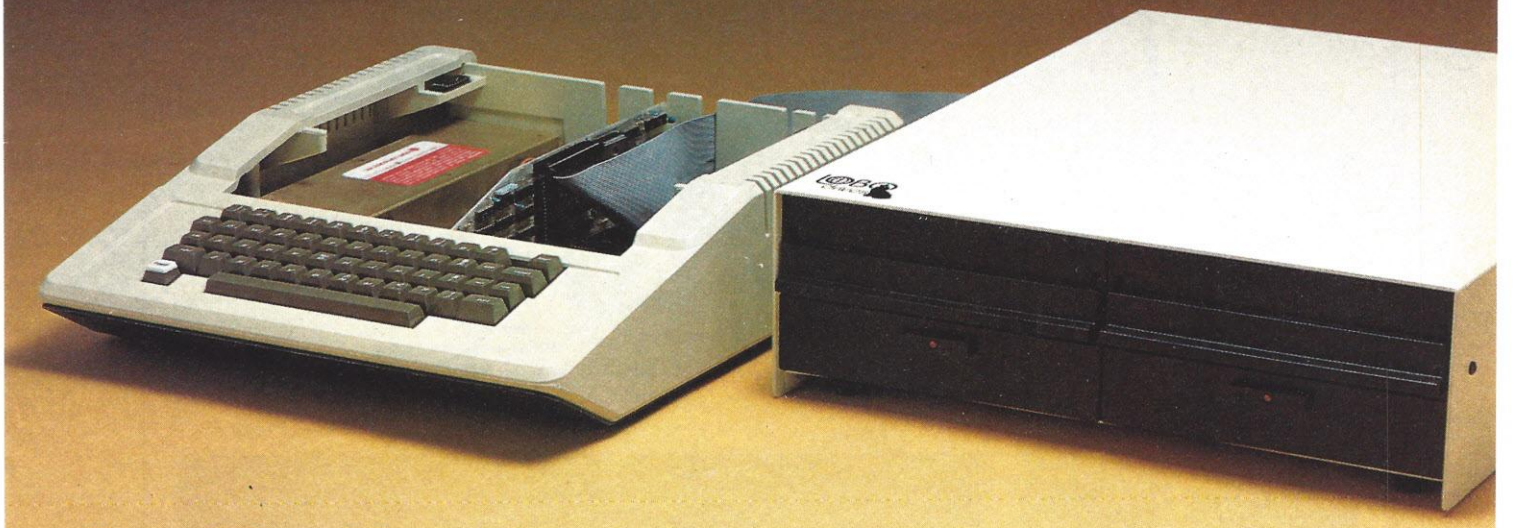

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CIRCLE 28

Steven Grossman

Computing in the kitchen—a gourmet's delight

When's the last time you saw someone jump for joy at the thought of a grocery-shopping expedition? Let your computer do the legwork—with no forgotten bananas

Who wants to balance a home budget by hand anymore? And who wants to go over drill and practice lessons with the kids when the computer does it better? Who wants those sleepless nights worrying about the IRS when the computer can print an almost foolproof 1040? And perhaps most tedious of all, who wants to shop for groceries and take care of food preparation?

No, a computer will not whip up a souffle or beef stroganoff at the press of a button, but with the right software it will plan a dinner menu for a whole month, prepare a weekly shopping list complete with approximate cost, and analyze your diet for nutritional deficiencies. It can even help you lose some of those extra pounds.

Russ Connel of Aurora, Colo., has learned the versatility of his personal computer. An engineer and personal computer enthusiast, Connel used to use his Commodore PET for checkbook balancing and keeping track of utility bills. Pleased with the way in which his personal computer was helping him, he decided to make it a full-fledged family member by applying it to some of his wife's chores.

To do so, Connel came up with a shopping list program that went far beyond the recording of needed comestibles: After a list of needed

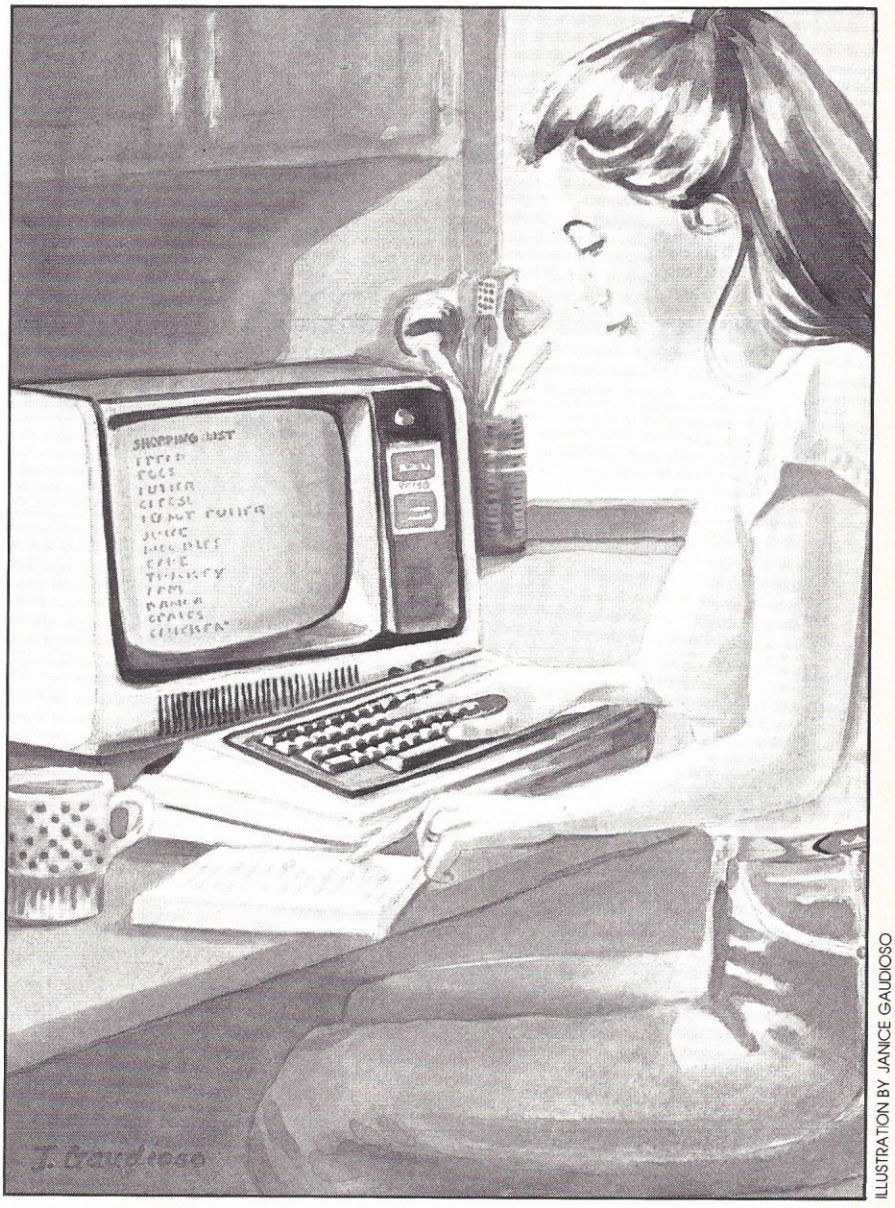
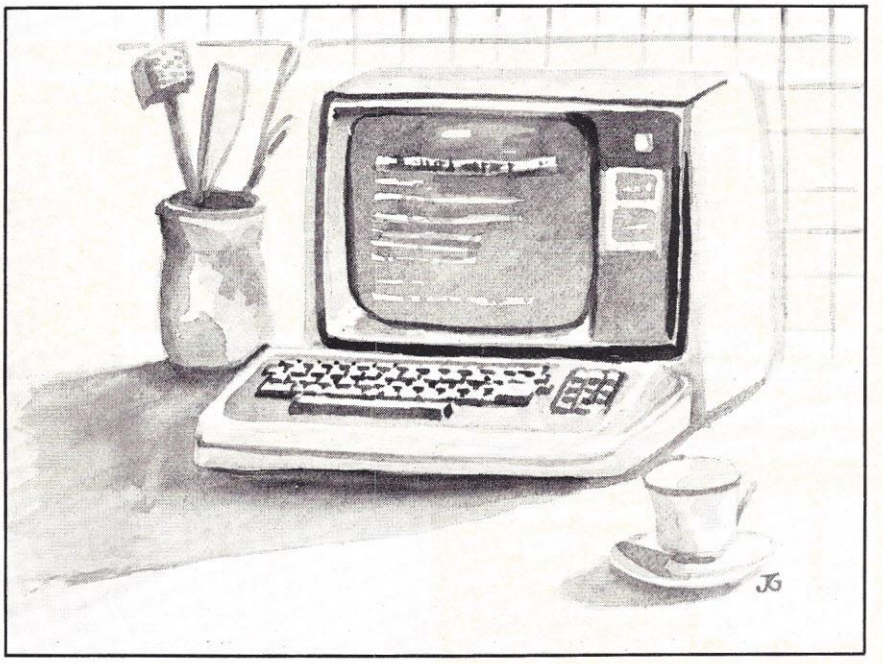


ILLUSTRATION BY JANICE GAUDIOSO

food items is entered (checked off on a coded list on his refrigerator), the computer prints out a complete list of items in the order that they appear on the shelves of the Connel's favorite grocery store, including the approximate total cost of the shopping trip and any deductions for coupons. The program also prints out what Connel calls an "average item cost index," which is simply the average cost of each food item bought on a particular shopping trip. With the index, Connel can track increases or decreases in food prices—an aid in food budgeting.



Half the tedium

After spending the two hours or so necessary collecting and entering a particular store's prices and item positions, Connel found that, on the average, shopping time was cut in half. He says that the program should be especailly helpful for family members who don't know where particular items are located in the store, as they are listed by aisle and in the order that they appear as you "S" through the aisles.

The program also cuts down on the time wasted deciding if you've forgotten anything. Needed food items are checked off on a weekly 250 item "master list" that lists all of the items originally programmed into the computer.

Finally, the program calculates the approximate total cost of each shopping trip before you go to the store, making sure that you aren't caught short, and allowing you to check the register total for errors.

And Connel's kitchen program has reaped another benefit for him as well: money. He was able to convince Harry Briley of Briley Software of the program's usefulness, and Briley, intrigued by the program, decided to sell it under the name "Grocery Mart."

Alongside "Grocery Mart" on the software shelf are a few other shopping-list programs. "Shoplist," from House of Herman Software, is written for the TRS-80 Model I, Level 2 with 32k. The program prints out a weekly shopping list for a chosen grocery store, sorted by either aisle or department. The user must initially enter the ingredients and the ingredient quantities needed for each meal to be prepared. The position of each item in the chosen store must also be entered. To print out a shopping list, enter the name of each meal to be prepared for the following week. The computer searches the master file for the ingredients to each meal and prints out a sorted shopping list. Each diskette master file holds up to 350 ingredients.

"Super Shopping List" from Personal Computer Services, also prints out a shopping list sorted by aisle. Written for the TRS-80 Model I, Level 2 with 16k, the program stores the contents of up to 15 aisles, with up to 48 items per aisle. Super Shopping List works by prompting the user with a screen containing all of the items recorded for one aisle. When making up a shopping list, simply input the numbers of the items that you need in each aisle. If the aisle number of a particular item is unknown, the program searches for the item, and prints out the aisle number.

The program has a storage capacity of 720 items, but as with Shoplist, it does not record any price information on the various food items.

Is it soup yet?

To prepare a shopping list, you need a menu. Briley Software has a program, written for the Commodore PET, to help plan this daily menu. Called "Dinner's On," the program plans a dinner menu for up to 25 days, prints out a sorted shopping list for the whole menu, lists all of the ingredients for each meal, and picks a dessert for each day based on your 15 favorite desserts.

To generate a menu, first enter the main ingredients (both main meal and side dish) and quantities needed for each of up to 25 of your favorite meals. Up to nine ingredients are allowed for each meal. Up to 15 desserts can be entered with two ingredients per dessert.

When you run the program, the

computer also prints out a randomly picked menu of meals and desserts for a specified number of days. If you decide that the meal/dessert combinations are not to your liking (for example, chili and chocolate pudding), the computer prints out another menu, and continues doing so until you are satisfied.

When you are satisfied with the meal selections, the program prints out a sorted shopping list containing all of the ingredients necessary for all of the meals on the menu. On command, the program also prints out a listing of the ingredients in each meal.

Computerized calories

Lest we forget the hordes of calorie and nutrition-conscious personal computerists, Apple Computer has a software program called "Diet Analysis." Written for the Apple II with 48k, the program analyzes your diet for nutritional deficiencies, as well as for any caloric deficiency or caloric excess. To this end, the program also calculates your ideal weight based on height, sex, and frame size, and then itemizes your changing weight, caloric intake and level of activity over a given time period.

All data on nutritional and caloric requirements are in this program. Just enter the ingredients of your daily meals and your level of physical activity (for calculation of optimal caloric intake). If you don't wish to enter your meals every day, a standard meal menu may be set up over any length of time so that nutritional intake is entered automatically.

The program analyzes your diet for carbohydrates, calories, protein, vitamins, minerals, saturated fats and fiber. It alerts you to specific deficiencies and even tracks the daily intake of any specified substance (sodium, for example, if you are worried about high blood pressure).

For users of the Texas Instruments 99/4 personal computer, TI sells a plug-in module called "Weight Control and Nutrition." Like Diet Analysis, the TI program calculates your ideal weight range and caloric intake based on personal physical information. And, the program goes one step further than Diet Analysis. Instead of simply telling you if your diet is nutritional, it actually plans a daily three-meal menu based on food preferences, USDA minimum daily requirements, and your weight loss goals.

After inputting physical characteristics, desired weight loss, and the approximate number of days it will take to achieve your weight goal, the program determines if your goals are realistic. Then the program asks you to choose your favorite foods from its extensive food list, and prints out a complete weekly menu (breakfast, lunch and dinner) based on personal preferences and USDA minimum daily requirements. Once you have started your diet, the program tracks your changing weight against its predictions to see if you're on target.

Another diet program is "Dietary Nutritional Analysis" from Patient Care Data systems. Written for the TRS-80 Model II with 64k, the program calculates the daily nutritional and caloric intake of the user, given a daily menu.

Burn that fat

For those people who are not interested in nutrition but want to lose some weight, there is the "Diet Mate Weight Loss Predictor" for the TRS-80 Model I with 32k. This program computes the amount of calories burned daily based on your level of physical activity and physical statistics. It calculates what your daily caloric intake should be to achieve a given weight loss by a certain date. Conversely, it calculates the number of days required to achieve a given weight loss, given a specific daily caloric intake. One drawback of this program is that unlike the nutrition programs, you must compute your own daily caloric intake by looking up the caloric values of all your meals in an "old-fashioned" calorie table.

Another kitchen aid—non-software—is the food information service provided to subscribers of the Compuserve computer information network by *Better Homes and Gardens* (BH&G) magazine. Each month BH&G provides a series of reports on such topics as nutrition, calorie and cost information on various foods, as well as recipes and appliance tips. According to BH&G, the Compuserve service provides a means of obtaining information not normally printed in the magazine because of space limitations or limited reader appeal. The information can be fed into Compuserve, thereby made available to those who want and need it.

Buyer beware

There are many other available shopping list, menu planning and diet programs about which your dealer can inform you. But, when you decide to buy, make sure you know *exactly* what you're getting. As one software manufacturer put it, "There are a lot of shoddy products out there. For example, some menu programs will print out portions in decimals (e.g., 4.765 ounces of meat) instead of in fractions. Although this doesn't render the program useless, it makes it inconvenient to use, and computers are not inconvenient. Also, make sure you get a written software warranty stating that the program will work or your money will be refunded."

Is a computer really necessary to perform tasks that have been performed manually for as long as there have been kitchens, grocery stores and health and diet enthusiasts? Probably not. But a computer isn't absolutely necessary for any domestic task. The idea of these programs is to make tasks a little easier for the user.

continued on page 81

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CIRCLE 30

Duane R. Hope and Cecilia Wessner

LEISURE COMPUTING

A computerized cookbook: help for the gourmet

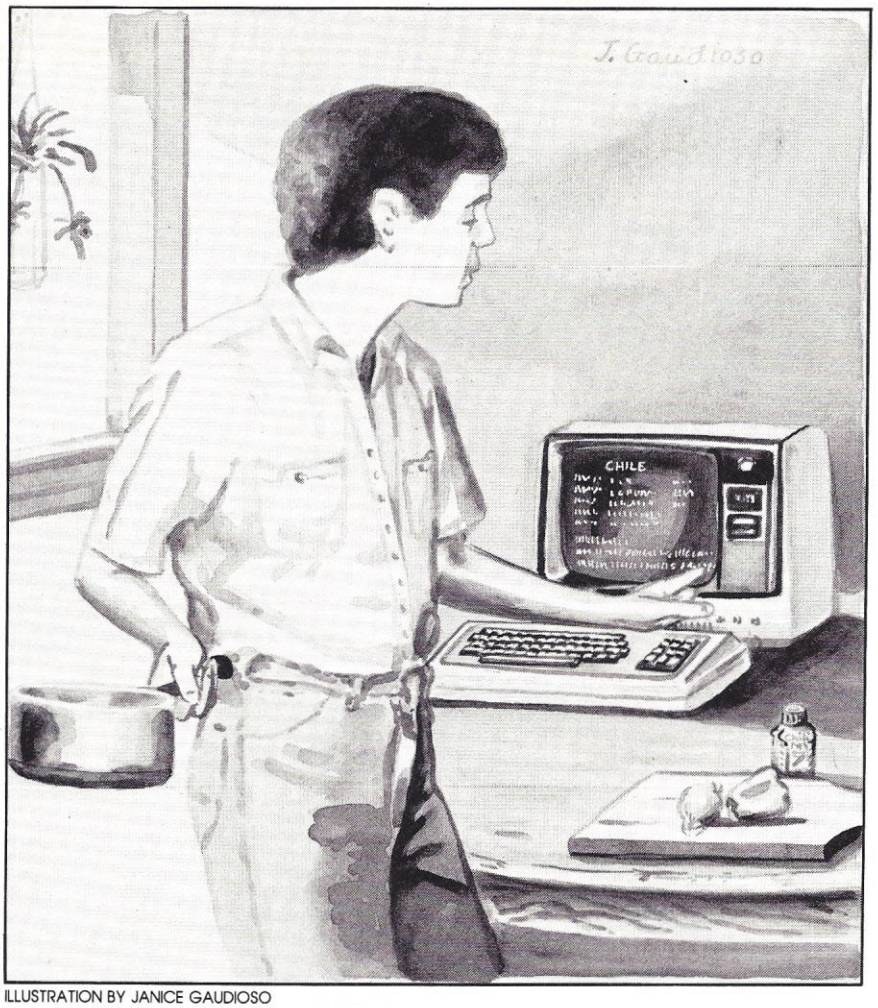


ILLUSTRATION BY JANICE GAUDIOSO

Grocery shopping and meal planning can make even a stoic cry out in despair. The choices of what to buy and in what quantity can be perplexing, not to mention time consuming. But before giving up and eating canned spaghetti eight nights a week, turn to that personal computer and cheer up. Automating a shopping list and planning a meal is as easy as balancing a checkbook.

To automate meal selections and prepare a grocery list on the TRS-80 Model I, two files are needed: an ingredient file and a recipe file. Each record on the ingredient file contains the name of the ingredient, the type of measured unit, the category and a total for the number of required units. Each record on the recipe file contains the recipe name, the cookbook reference and the amount of each ingredient needed to prepare the meal.

To build the recipe file, enter the ingredients of the desired meal directly from the recipe as it appears in the cookbook. If a recipe calls for an ingredient that is not already in the ingredient file, the ingredient can be added to the file while building the recipe.

When the recipes or meals are entered, a shopping list can be prepared. The computer finds the needed ingredients, totals the number of units required, and prints a list of ingredients sorted by grocery store departments.

Add that recipe

After loading and running the program, the main menu is displayed as

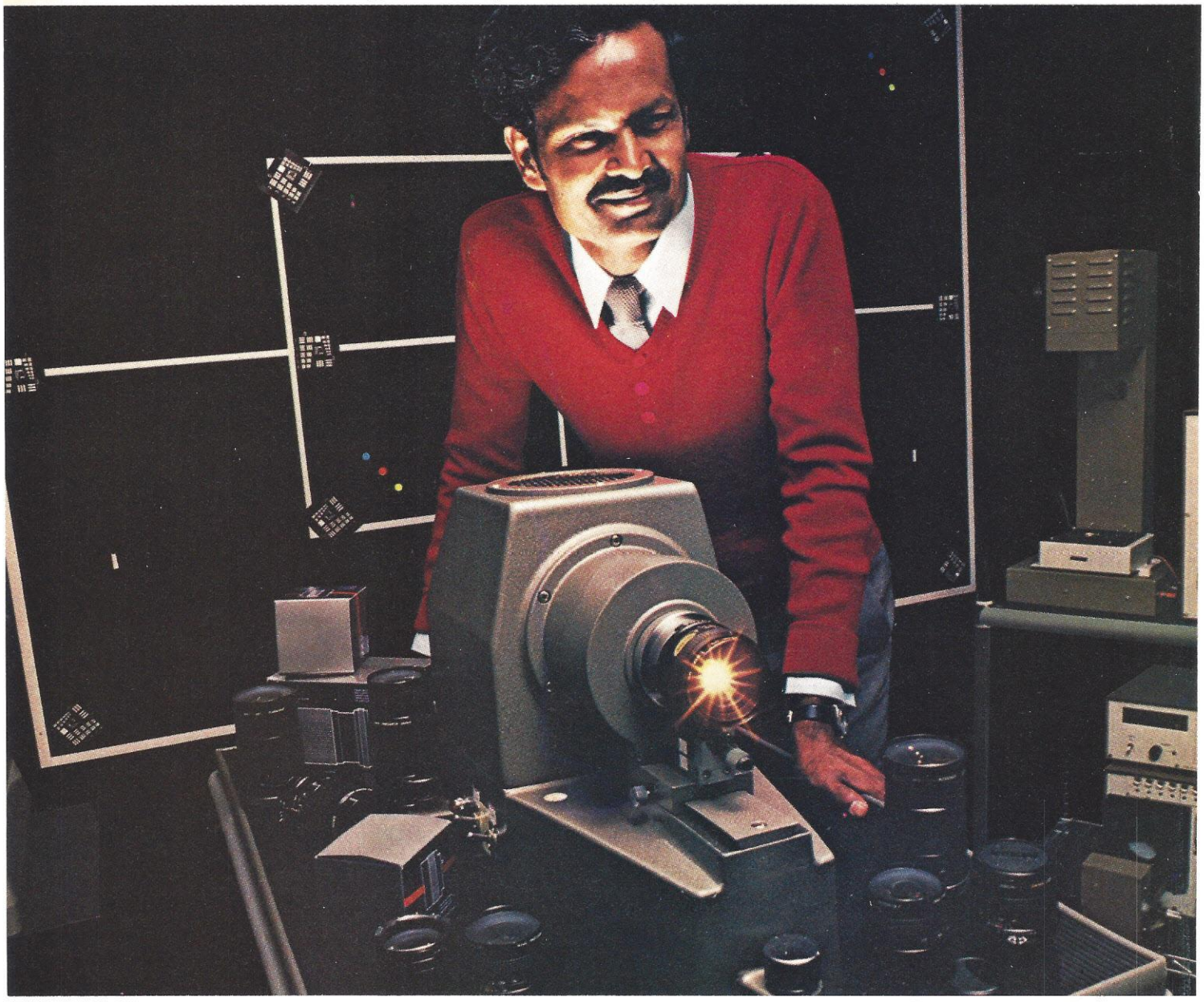
continued on page 99

Reddy Chirra improves his vision with an Apple.

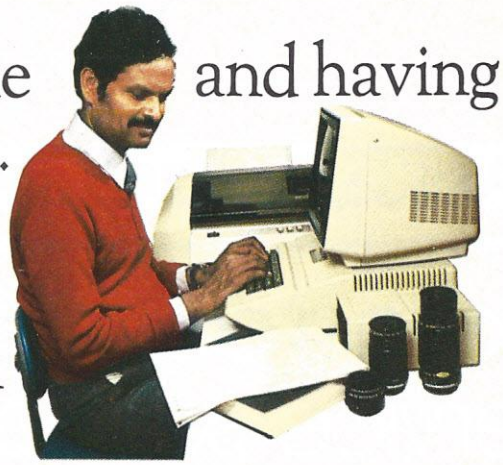
Reddy is an optical engineer who's used to working for big companies and using big mainframes.

But when he started his own consulting business, he soon learned how costly mainframe time can be. So he bought himself a 48K Apple II Personal Computer.

And, like thousands of other engineers and scientists, quickly learned the pleasures of



cutting down on shared time and having his own tamper-proof data base.



His Apple can handle formulas with up to 80 variables and test parameters on 250 different optical glasses.

He can even use BASIC, FORTRAN, Pascal and Assembly languages.

And Apple's HI-RES graphics come in handy for design.

Reddy looked at other microcomputers, but chose Apple for its in-depth documentation, reliability and expandability.

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CIRCLE 31 FOR MORE INFORMATION

CIRCLE 99 FOR SPECIAL O.E.M. INFORMATION

Nailing down those service solutions

No need to break into a cold sweat if your personal computer breaks down–not if you've done your homework on service options

Getting service for a personal computer can bring on visions of red tape and passing the buck. There are warranties and service contracts to be considered. There are vendor and seller warranties from which to choose. There are "in-house" or "on-site" servicing costs to be weighed. And, finally, the prices of all of these options must be examined.

These servicing options, or the lack of them, can be especially confusing for a budget-conscious school. Take, for example, the Pleasant Valley School District that purchased a personal computer and 10 terminals. Because of the $1500 price tag, the school did not purchase the service contract. Software programs for drill and practice were also purchased, but the seller had no warranty or service contract available for them.

Without a warranty, the school would have to carry the costs of servicing should the computer break down, and one day it did. After a series of calls were made to the computer and software sellers with no servicing result, Pleasant Valley realized that they were caught in a circle of red tape.

Although the sellers seem clearly at fault, Pleasant Valley must also share the responsibility of nonexistent servicing—the administrators were unaware of the options and the benefits of a service contract. The only innocents in this story were the students of Pleasant Valley: It was nine school days before the system was back in operation.

This operating standstill could happen to any small-business proprietor, professional or educator who depends on a personal computer in his business or profession. Can these users do without billings, payables or payroll for nine working days? Obviously not.

The options

With any automated device, there are four ways in which service can be accomplished. Each of these options must be explored by the prospective purchaser of a personal-computer system:

- The device can be so perfected that service is virtually unneeded.
- The device is so common, and its components so standardized, that thousands of dealers can service it.
- The owner of the device can have the wherewithal to service it himself.
- The vendor or seller can service the device.

The first option does not exist.

The second option does not exist either. While personal computers have become relatively common, they are not common enough to support very many personal-computer repair shops. And they have not been in existence long enough for many service technicians to have been trained. Finally, there is almost none of the standardization required for such training to have general applicability. However, this situation is already changing with the rapid acceleration of personal-computer purchases.

Self-servicing, the third option, is possible but usually not very practical. Trouble shooting a system like Pleasant Valley's requires some knowledge of the microprocessor, the disk units and the terminals, which translates into a relatively expensive technician. Trouble shooting also requires some specialized equipment, which is also expensive. And enacting a quick repair of the hardware means having an inventory of components, or at least boards, which is another expensive prospect. For a typical small-business system, the out-of-pocket service cost might even exceed the cost of the original system. (And that's ignoring the cost of not being able to use the system while trouble shooting it.)

Vendor or seller service, the fourth

Floyd McWilliams and Laurence Russell

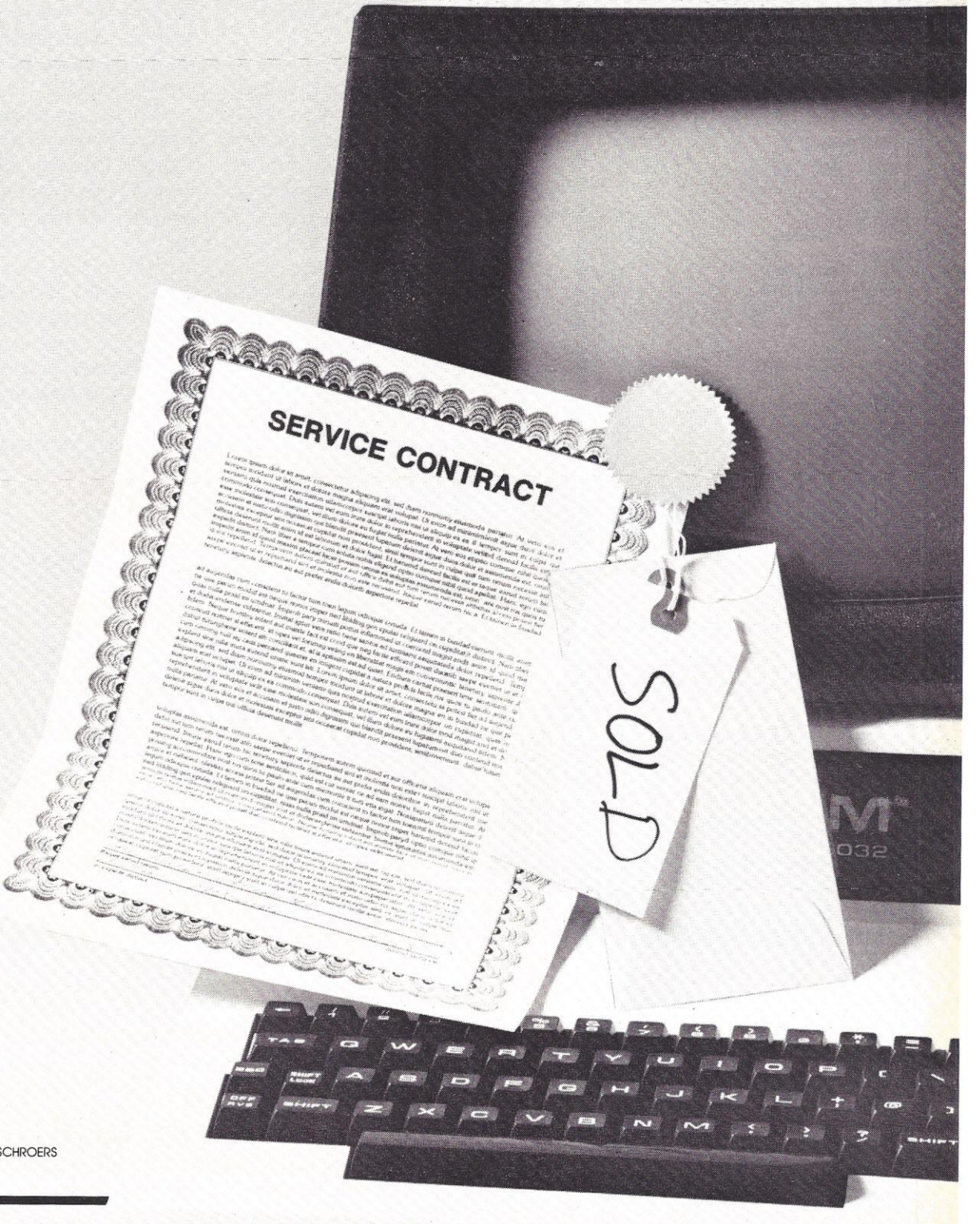

PHOTO BY KENNETH W. SCHROERS

BUSINESS COMPUTING

option, is the only practical option for most prospective buyers of personal-computer systems today. And that leads to a very complex situation: insuring that the user is adequately protected against failures of the computer hardware or software.

Protection schemes

Most, if not all, personal computers on the market today include a 90-day warranty. Many of the more stable and established vendors are now offering "extended warranty options," which extend a warranty to one year. For a basic personal computer (not including terminals, for example), the extended warranty option costs approximately $200, and the purchaser must bring the defective item to the service site, usually the store from which it was purchased. An extended warranty is a form of service contract: This particular variety is called "in-house" servicing.

Some computer stores, or "sellers" to distinguish them from vendors, offer their own version of an extended warranty. For a basic system, a typical seller-sponsored extended warranty would be for one year and would cost approximately $500, providing professional service at the purchaser's location. Again, this is a form of service contract and is called "on-site" servicing. In many cases, the seller only represents a vendor, but it doesn't matter as long as one of them, vendor or seller, provides reliable, long-term service.

Finally, some vendors, such as Data General, provide standard service contracts that are not paralleled

SERVICE QUESTIONS

1. How long have you had your personal computer? (If less than four months, thank them politely and talk to someone else.)
2. Do you get service as part of the purchase price of your personal computer? (If "yes" skip #3.)
3. Do you have a separate service contract?
4. Are you satisfied with the service you've received? If not, could you tell me some specifics?
5. How often have you needed service?
6. What has been the response?
7. How long did you have to wait until your computer was operable each time?
8. What type of service did you require? Hardware? Programs? Operating? Other? Could you give me specifics?
9. Did they *really* fix whatever was wrong?
10. Were there any *unexpected* charges for service? If so, could you tell me the specifics?

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While state of the art programmers exist, they must feel confident that their efforts will be developed and marketed by a company with the experience and strength to assure complete success for their products.

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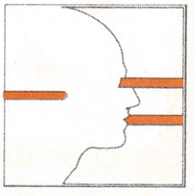

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CIRCLE 33

SERVICE CHECKLIST

	YES	NO	COST
1. Does long-term service come with the system? (If so skip item 2.)			
2. Can you purchase a service contract? TWO "NOS'" = DON'T BUY FROM THIS VENDOR-SELLER COMBINATION.			
3. Is the service on-site (at your location)? (If "NO" be sure and include some costs for tranporting defective items to the service location.)			
4. Will the vendor or seller guarantee same-day service? (If not, can you live without your machine for more than one day?)			
5. Is the vendor or seller's source of service within 150 miles of your premises? (If not, can you live without your machine for more than one day?)			
6. Have you talked to at least two other customers of your vendor or seller* about service? (If not, you're not ready to buy a personal computer.)			
7. Were you satisfied with their responses? (If not, either find a new vendor or seller or talk to more customers of this one.)			
8. Is there any service documentation provided with the system?			
9. Is there any service training available to you for this system?			

(* Don't let the vendor or seller tell you which customers to talk to.)

by their franchisees. Provided that the seller is reputable, it should not matter whether a service contract is purchased from the seller or the vendor. Nor should it matter whether it's called a service contract, an extended warranty option or some other name. What matters is that reliable service is provided beyond 90 days.

Checking it twice

Two comprehensive checklists have been developed to determine if adequate service will be provided by a vendor or seller. The checklists cover both hardware and software because the user must be protected if either, or both of them fail. No matter what other features a personal computer has, if it doesn't have solid servicing it's a time bomb.

When using the first checklist, go down the list a point at a time and check off "yes" or "no" for each item. Cost for item 1 or 4 may have to be added, but cost *must* be added if item 2 is answered "yes." A user is ready to make a decision only if "no" does not apear on the checklist or if there is a "no" in item 3 and he is willing to transport the defective item. If the answer to items 1 and 2 is "no," don't purchase the system from that particular vendor or seller.

To get the most effective use from the checklist, go through it twice: once for the computer and once for the software to be used (whether or not there is an additional charge for the programs). Realistically, a warranty or service contract for software may not be available. If not, go through the second checklist and measure the developer's treatment of other customers.

The second checklist is actually a list of questions to be asked when speaking to current customers of a prospective vendor or seller about the service they've received. To use this list, just fill out the answers to the questions and follow your best judgment. Go through the questions twice unless the programs are purchased from the same vendor or seller from whom the hardware is purchased.

Pleasant Valley survived because, unfortunately, people have to tolerate their children's education being suspended for nine days. But a small-business proprietor or professional cannot live without customer billing, label printing, payroll, etc., for very long. Before investing in a personal computer, ask yourself how long you can do without it once its operational. Unless the answer is indefinitely, make reliable service one of your absolute requirements

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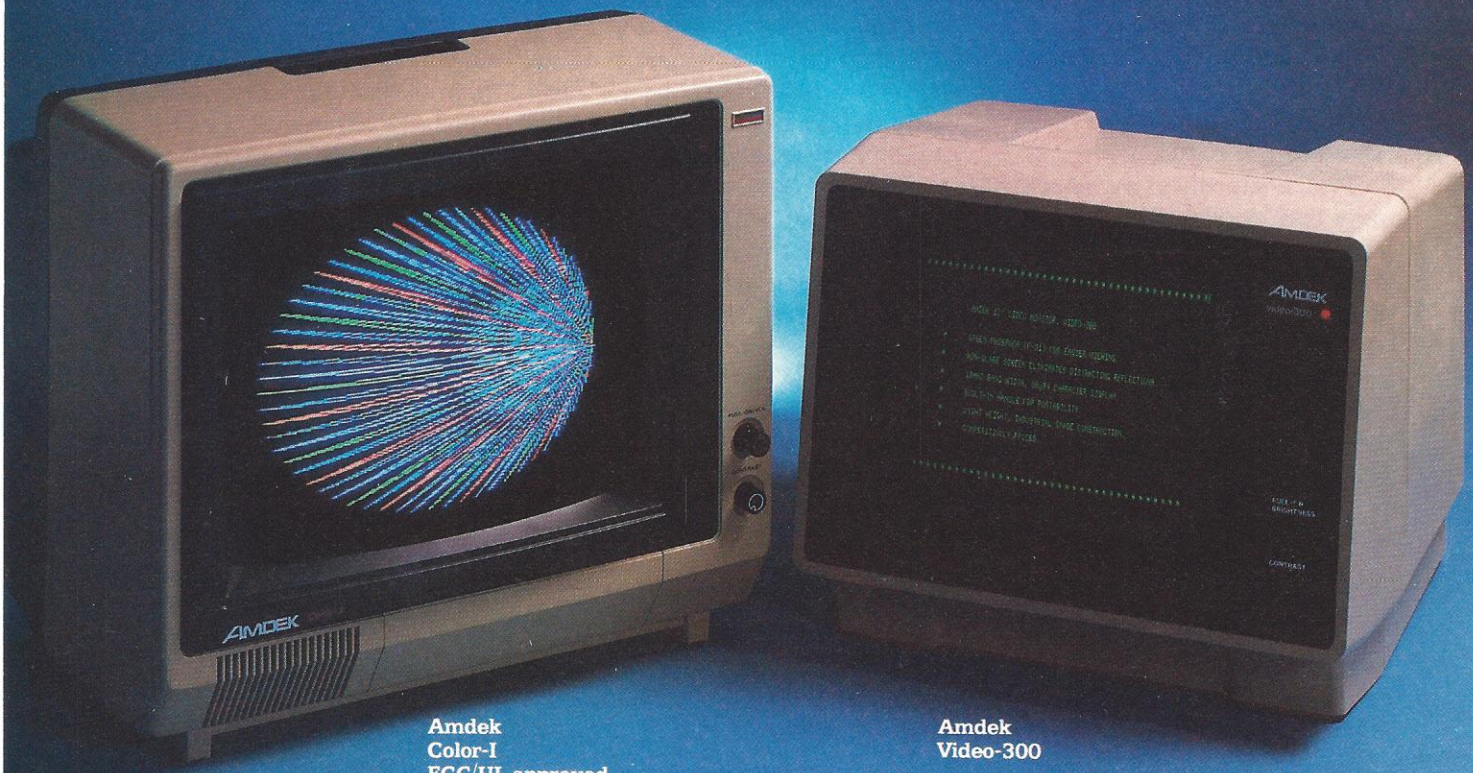

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CIRCLE 36

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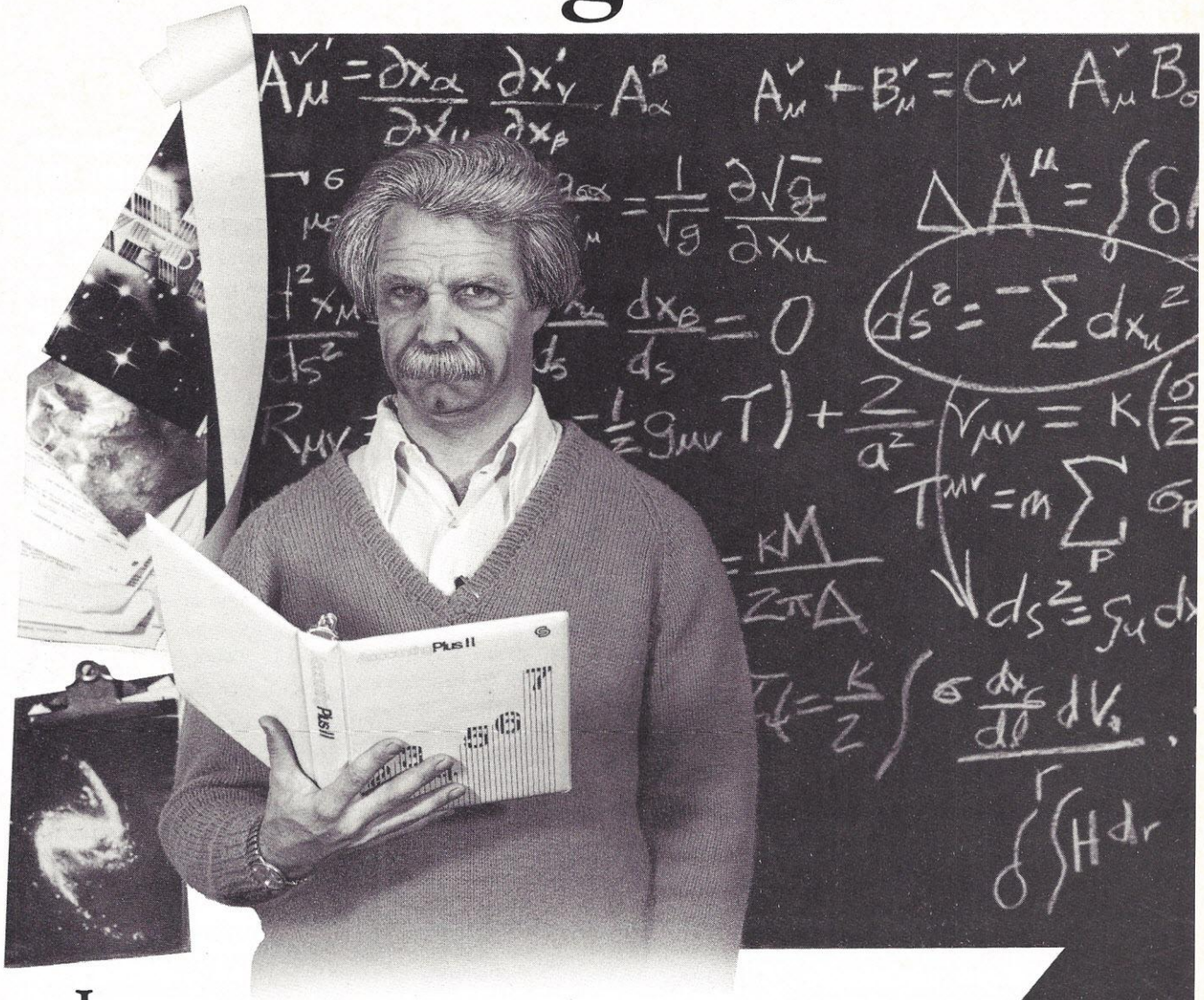

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CIRCLE 35

Martin A. Nemzow

Fixed formats, and the input is easy

Error-ridden programs got you down? Jumbled formats giving you tired, aching eyes? Then you need a dose of fixed-format data entry for foolproof, visually impressive programs.

On the Apple II (and other personal computers) it's easy to write flashy data-entry routines. And since some have had difficulty finding an effective text editor, it is usually easier and more efficient to write whole-screen, fixed-field, data-entry routines than to contend with streams of "??" scrolling off the screen. Further, the power of the basic string functions allows for effective input error-checking to make programs foolproof, and such routines can be interwoven into the entry programs. The flash and inverse-print options give visual information about the type and shape of data to be entered. This is especially important to users who are unfamiliar with a particular program, and others who mindlessly enter data all day long; visual cues lessen the probability for error. The vertical and horizontal tabbing features help format the screen in visually appealing layouts and lessen eyestrain because the eyes don't have to roll to keep up with the machine.

"It is usually easier and more efficient to write whole-screen, fixed-field, data-entry routines."

There are several algorithms that are important in writing data-entry routines. First, assume a program requires either a "yes" or a "no" response—a "Y" or a "N" is the standard input; the computer should reject others. If it doesn't , a program option may be inadvertantly missed, because the Apple keyboard buffers one character. If a stray key is buffered by the keyboard, and the program is designed to execute the option only on a "Y" response, then the key is interpreted as a negative response. The GET command circumvents this problem: It's fast and is geared to single-character input. Also, GET requires no carriage return to input the character.

The three lines of code in figure 1 (page 146) show how to solve this problem using GET. All printing to the terminal is repeated in a fixed screen location with Applesoft HTAB and VTAB functions (or their equivalents) in other versions of BASIC.

The program goes to line 300 on a "Y" response; on an "N" response, line 530 would be executed. The semicolon after the print suppresses the line feed and carriage return, and is more professional. Characters other than the "Y" and the "N" are rejected. This even includes CTRL-C, the program interrupt.

With a reset, a program can abort input without crashing. This is accomplished by adding line 505 (see figure 2, page 146).

The character "N" is the ASCII code for the abort character of your choice. The escape key (27), a carriage return (13), or a CTRL-C (3) are reasonable choices. Those who program in BASIC (other than Applesoft) should substitute the character itself for the CHR$ character-generating function. As another option, the program can print a CTRL-G (the bell) if the input is unacceptable. This prompts the user for input, or audibly indicates that a response has been recognized.

What else can GET do? The INPUT command could be used in place of the loop and the GET command in figure 3 (page 146). But the GET function and a loop work well because input can be checked character by character. The disadvantages are a loss of speed and the extra programming involved.

The figure 3 (page 146) example is fine except that most typists make errors, and it's friendly to get a "bell" when near the end of a line. To make the program more versatile, activate the left and right arrows and the carriage return. The right arrow will allow for automatic retyping. Another key should be defined as a line-delete key, since an incorrect entry may be easier to wipe out by deleting the entire line than by backspacing and overtyping. The idea is to make the arrows increment the character-input loop counter *and* the FOR. . .NEXT counter, and the carriage return should cause execution to drop through the loop. There is a complicating factor: The character input cannot be concatenated (strung together) blindly to form a string; backspaces and other mistyped entries—like control characters—will be appended to the string and will not appear on the monitor, but they will appear on a printout.

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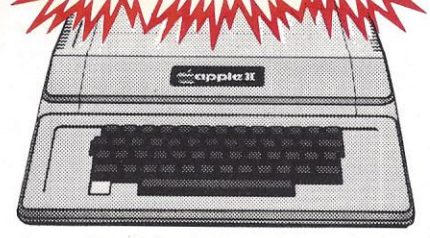

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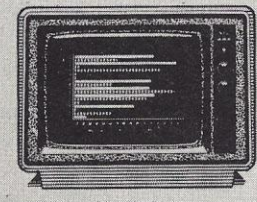

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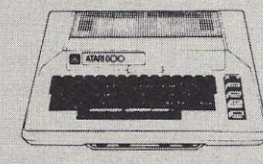

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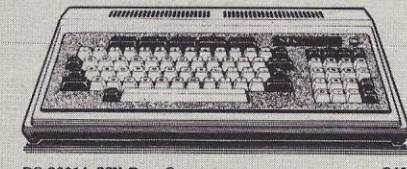

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CIRCLE 39

The solution is to input character by character, rather than concatenate the string (as shown in figure 3, page 146). First assign the input into a character array the same size as the length of the string. Concatenate the individual entries to form a string at the end of the loop. Individual entries are assigned specific locations in the array; these elements are only changed when overtyped by characters other than the arrows and carriage return. This is important if data are stored on disk in a fixed and highly structured format. Strings that appear to be 25 characters long will in fact be 25 characters long—without special characters invisibly imbedded.

In the next program (figure 4, page 148), the arrows are not assigned as characters, and if the algorithm is followed, will not appear as part of the string; they only increment the cursor counter. Likewise, the carriage return and the abort key are never entered into the character array. The counters are not and should not be incremented by a FOR. . .NEXT loop in all cases. An "abort" that sends execution elsewhere outside the loop will cause a nasty error (NEXT WITHOUT FOR) when BASIC wonders what happened to the rest of the loop. Mixed procedures for incrementing the loop counters also make for unreadable and unstructured code.

How the program works

The secret to activating the arrows is the fact that the right arrow doesn't do anything—it is effectively a dead key. The left arrow, the backspace, subtracts *two* from the character-input loop counter, because the counter is incremented later in the loop. The last noteworthy exception concerns the endpoints: The cursor should not move outside its field or off the screen. Lines 370 and 389 control the endpoints of the field.

This example program dovetails with the complete address entry program in figure 5 (page 148). Line numbers ending with a "9" are replaced by other, slightly different lines with a line one number higher. (For example, line 159 is *replaced* by line 160. Lines 480, 490, 500, 510, 520 and 530 are deleted.)

Field lengths

What if you have to enter data into ragged fields of different sizes? Ragged fields are multiple fields—perhaps with a few on one line—of varying lengths and in arbitrary locations. Suppose you want to enter last name, P.O. box, and telephone number. Let name go into columns 1–15, box number into columns 18–23, and telephone number in columns 25–39. We need an array of starting values for the fields and the length or ending values (see figure 6, page 148). If the fields are on separate lines, then another array will be needed for vertical tabbing instructions.

- The backspace and the right arrow should not move the cursor outside the field.
- The arrows should not move the cursor outside the immediate field without some special override.

The first point will be demonstrated; the second is more sophisticated and may not be desirable in some applications. VisiCalc, for example, has very structured fields and uses the arrows exclusively as the field override characters. In our example, (see figure 7, page 148), the cursor will not be trapped within a field. Vertical tabbing is done one line at a time and requires a simple outer loop with X as the outer loop counter. Provisions can also be made to allow the screen to scroll by VTABing with 24 (or, if a smaller window is set, the value of the lowest line). Don't forget to define the

continued on page 112

Meal planning and shopping

continued from page 81

Figure 1

```
CANDY'S MENU / SHOPPING LIST PROGRAM

01 SELECT MEALS
02 FILE MAINTAIN RECIPES
03 FILE MAINTAIN INGREDIENTS
04 LIST RECIPES
05 LIST INGREDIENTS
06 LOAD INGREDIENTS & RECIPES
07 SAVE INGREDIENTS & RECIPES

ENTER DESIRED FUNCTION
```

Figure 2

Chili
Hope Cookbook - page 4

Ingredient	Units	Category	Qty
Ground Beef	LB	Meat	2
Red Kidney Beans	OZ	Canned Vegetables	30
Tomato Juice	OZ	Canned Juices	32
Salt	TSP	Spice	1
Black Pepper	TSP	Spice	.25
Chili Powder	TSP	Spice	8
Onion-Chopped	OZ	Frozen	4

Meatloaf
Hope Cookbook - page 6

Ingredients	Units	Category	Qty
Ground Beef	LB	Meat	2
Eggbeater	OZ	Frozen	4
Bread Crumbs	OZ	Bread	12
Onion Soup Mix	PKG	Soup	1
Catsup	TBSP	Pickles	4
Brown Sugar	TBSP	Sugar and Flour	2
Dry Mustard	TSP	Spice	1
Ground Nutmeg	TSP	Spice	.25

shown in figure 1. In response to the prompt ENTER DESIRED FUNCTION, enter 2 for the addition of a recipe. (This function maintains the recipe file.) In response to the prompt ENTER 1 TO ADD, 2 TO CHANGE, 3 TO DELETE? enter 1.

To enter the recipe, first type in the recipe name. For the example in figure 2, enter CHILI. The cookbook name and the page number where the recipe can be found are then entered, such as HOPE COOKBOOK - PAGE 4.

The program then asks for the ingredient name. The first ingredient for this example is ground beef. After the ingredient name is entered, the program scans the ingredient file searching for the name just entered. If the name is not found, the monitor displays the following: INGREDIENT 'GROUND BEEF' NOT FOUND. DO YOU WANT TO ADD IT (Y/N)? Since ground beef is needed to make chili, enter Y and the ENTER UNITS command is displayed.

The type of units entered are those most frequently used in the other input recipes (lbs. for meat, tsp. for spices, etc.). For the ground beef example, enter LB and the ENTER THE CATEGORY command is displayed.

The category is the section of the grocery store where an ingredient is found. For this example, enter MEAT and the final prompt, ENTER THE NUMBER OF LB'S REQUIRED, is displayed. Since the chili recipe requires two pounds of ground beef, enter 2.

To add the remaining ingredients listed in figure 2, follow the same procedure for ground beef. When the information for the last ingredient is entered, the program again displays the prompt, ENTER INGREDIENT NAME. Hitting the enter key

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CIRCLE 34

completes the recipe, and the computer requests the second recipe.

To follow the example, enter the second recipe, meatloaf, as shown in figure 2. When ground beef is entered in response to ENTER INGREDIENT NAME, the program scans the file and prints IS THIS THE ONE 'GROUND BEEF' (Y/N). Since this is the needed ingredient, enter Y, which eliminates the need to input the units or category for ground beef. The confirmation of the ingredient is needed because of the technique the computer uses to search the ingredient file. The required ingredient is used as a parameter in the INSTR function, and ground beef could have been a substring of another ingredient already on file, such as ground-beef patty.

To err is human

In response to the prompt ENTER 1 TO ADD, 2 TO CHANGE, 3 TO DELETE? the recipe for chili was added by entering 2. But, if a mistake was made while entering the recipe, the same prompt can be used to change or delete the recipe entered in error.

For example, if an error of ingredient quantity was entered for chili, request function 2, FILE MAINTAIN RECIPES. Then request subfunction 2, change, and the program asks WHICH RECIPE DO YOU WISH TO CHANGE? Enter the recipe name, and the program asks for confirmation of the recipe on file. Since there is no change in the chili recipe, hit the enter key and the computer displays the prompt ENTER CHANGE FOR COOKBOOK REFERENCE 'HOPE COOKBOOK - PAGE 4'? Again there is no change. Hit the enter key once again and the program asks if any ingredients are to be changed. Since there is an error of ingredient quantity in the recipe, enter Y and the ingredients are displayed on the screen as shown in figure 5.

To change the quantity of a specific ingredient, enter its number in response to the program prompt ENTER INGREDIENT NUMBER TO CHANGE? The program then asks if there is a change for the ingredient. Unless the ingredient itself is to be changed (for example, changing salt to pepper), hit enter to receive the final prompt to change the quantity of the given ingredient.

After correcting the ingredient amount, the program returns to the initial prompt, ENTER INGREDIENT NUMBER TO CHANGE? To add another ingredient to the recipe, enter a number one higher than the last ingredient number. (The prompts are the same as those for the original recipe.)

When adding ingredients, some existing ingredients may seem unappealing. To delete these ingredients, change their quantities to zero

Figure 3

```
SELECTED MEALS FOR WEEK OF 12/15/81

CHILI - HOPE COOKBOOK - PAGE 4
MEATLOAF - HOPE COOKBOOK - PAGE 6
```

Figure 4

```
CANDY'S SHOPPING LIST FOR WEEK OF 12/15/81

BREAD CRUMBS        12 OZ  BREAD
TOMATO JUICE        32 OZ  CANNED JUICES
RED KIDNEY BEANS    30 OZ  CANNED
                           VEGETABLES
EGGBEATER            4 OZ  FROZEN
ONION CHOPPED        4 OZ  FROZEN
GROUND BEEF          4 LB  MEAT
CATSUP               4 TB  PICKLES
ONION SOUP MIX       1 PK  SOUP
CHILI POWDER         8 TS  SPICE
SALT                 1 TS  SPICE
DRY MUSTARD          1 TS  SPICE
BROWN SUGAR          2 TB  SUGAR AND FLOUR
```

or delete the entire recipe with subfunction 3 and re-enter it.

If there are no further changes or additions to the recipe, hit enter and the program returns to the prompt requesting the name of the recipe to be changed. Hit enter a second time to return to the program menu.

Erase it

If a recipe is to be deleted, request function 2, FILE MAINTAIN RECIPES. Then request subfunction 3, delete, for the prompt WHICH RECIPE DO YOU WANT TO DELETE? If the chili recipe is to be deleted, for example, enter CHILI. The program will continue to request recipes until the enter key is pressed, returning the program to the main menu.

The shopping list

Now that the correct information is entered into the program, a shopping list can be printed for the ever-popular trip to the grocery store. Request function 1 and the program asks for confirmation of a menu-selection list. Enter Y and the selections are displayed on the video monitor.

The monitor listing is followed by the prompt ENTER MEAL DESIRED. Enter CHILI and the program asks for confirmation of the recipe. The prompt ENTER MEAL DESIRED is again displayed, allowing the choice of several meals for the grocery list and alleviating the canned-spaghetti syndrome. Hit enter to complete the meal selections.

The date for these meal selections is then requested. For the example shown in figure 3, enter 12/15/81. The program then asks, DO YOU WANT HARD COPY (Y/N)? If a printer is unavailable, enter N and the meals are displayed on the monitor. When the meal list is printed, the instruction HIT ENTER FOR SHOPPING LIST is presented. The completed shopping list is shown in figure 4.

Other functions

In addition to maintaining recipes and selecting meals, the program keeps the ingredient file, lists recipes and ingredients, and saves and loads ingredients to and from disk.

Function 3 maintains the ingredient file. Ingredients can be changed or deleted by following the program prompts, similar to those in function 2. (There should be no need to add an ingredient with this function, since it may be added when recipes are input.) There is one word of caution, however. Do not delete an ingredient unless every reference to it has been deleted from the recipes. Also, if a type of unit must be changed, be sure the recipes calling for this ingredient have the correct number of units.

Functions 4 and 5 are available to list the entire recipe and ingredient files. The program only lists these files on the video monitor, however.

Functions 6 and 7 are available for loading and saving the files, using a disk for storage.

Figure 5

CHILI - HOPE COOKBOOK - PAGE 4

NO.	INGREDIENT	QTY	UNITS
1	GROUND BEEF	2.00	LB
2	RED KIDNEY BEANS	30.00	OZ
3	TOMATO JUICE	32.00	OZ
4	SALT	1.00	TSP
5	BLACK PEPPER	0.00	TSP
6	CHILI POWDER	8.00	TSP
7	ONION CHOPPED	4.00	OZ

ENTER INGREDIENT NUMBER TO CHANGE

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The Star Maker

*Runs on most Z80/8080/8085 microcomputers with CP/M (TM of Digital Research); 48K; and terminal with addressable cursor.

CIRCLE 40

The budget battle

continued from page 36

from each other—what used to be a day's work of typing takes a half hour with a word-processing program.

Harvesting programs

A decidedly less stable type of business, and one that would seem less amenable to computer streamlining in the budgeting process, is farming. But Phil Goulet, who has a thousand acres of crops and some cattle in Oregon, has done more than his share to give farm budgeting more stability.

Goulet bought an Altos computer in 1977, and discovered there were no agriculture-dedicated programs to go with it. In collaboration with the CPU International software house in Salem, Ore., he devised several farm-oriented programs that have since been commercialized: a payroll program suited to a fluctuating labor force, and general ledger and accounts receivable programs especially for farm use. (The latter two programs also serve another Goulet business, which sells racing-car parts.)

Goulet programmed budgeting power into the ledger software. Each crop is its own cost center, broken down into the types of expenses that the crop is subject to. With a few keystrokes, Goulet can get an up-to-the-minute balance sheet, projected further to any of several possible time frames.

In some businesses, there is no inherent budgetary structure before it seems worthwhile to devise one. Vic Kristenson of San Jose, Calif., is a one-man business; to be more precise, he's a three-business man.

Kristenson, who was with IBM sales and systems for 22 years, started his own export business in mainframe components six years ago; began packaging small-computer systems for domestic customers two years ago; and is now starting a computer-service bureau. Along the way, he installed an Apple II Plus in his office.

Kristenson uses financial software from Spectrum Software, Sunnyvale, Calif., for routine recording of transactions, and he uses VisiCalc, the financial modeling package from Personal Software (also of Sunny-

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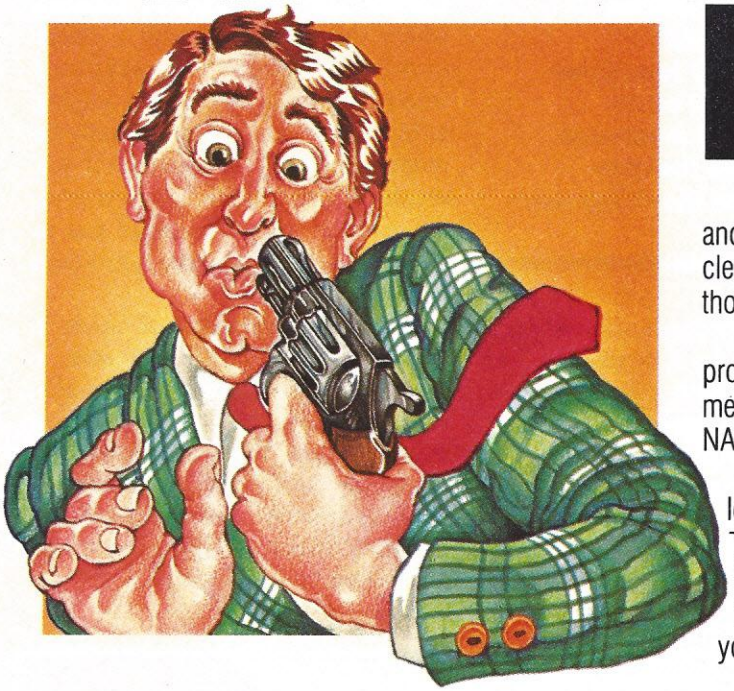

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CIRCLE 47

vale), for both budgetary and non-budgetary purposes. VisiCalc helps to determine the best way to allocate the general costs of business to the three companies; it also helps to determine the true margin of profit or loss on the sale of a certain piece of hardware.

Kristenson says that before he put the Apple to work, he often made judgments "by the seat of my pants." He sometimes wasn't sure which of the products he shipped were the more profitable. He also used to enter bids for equipment or accept quoted prices when a few minutes at a computer might have told him the goods were overpriced. On the whole, Kristenson says, the computer has given him more control over his businesses because he has access to better and more complete information.

"The books were always behind, receivables ere sometimes misplaced or lost, some categories of costs were loosely monitored. Those were the days B.C. Before the computer."

With a similar personal computer configuration to Kristenson's—an Apple II Plus with 48k of random-access memory, Spectrum Software's Microaccountant program, and Universal Business Machine's program for financial planning—Dale Lipsett is the computer man for four companies under one roof in the West Texas town of Eldorado. Before he arrived in March, the books had been done by hand. What he has achieved, Lipsett says, is "speed of knowing where the money is," and a closer month-by-month oversight of whether or not expenses are staying in line. "Adjustments can usually be made up or down on a budget if you see deviations in time," Lipsett says. "A personal computer allows you to make a much better, more up-to-date decision."

Personal computers have made it easier for these small-businessmen to follow the first rule in entrepreneurship: Keep the books accurate and up to date. Those businesses that recognize when it's time to computerize have a better chance of surviving in a time when thousands of ventures are falling by the wayside.

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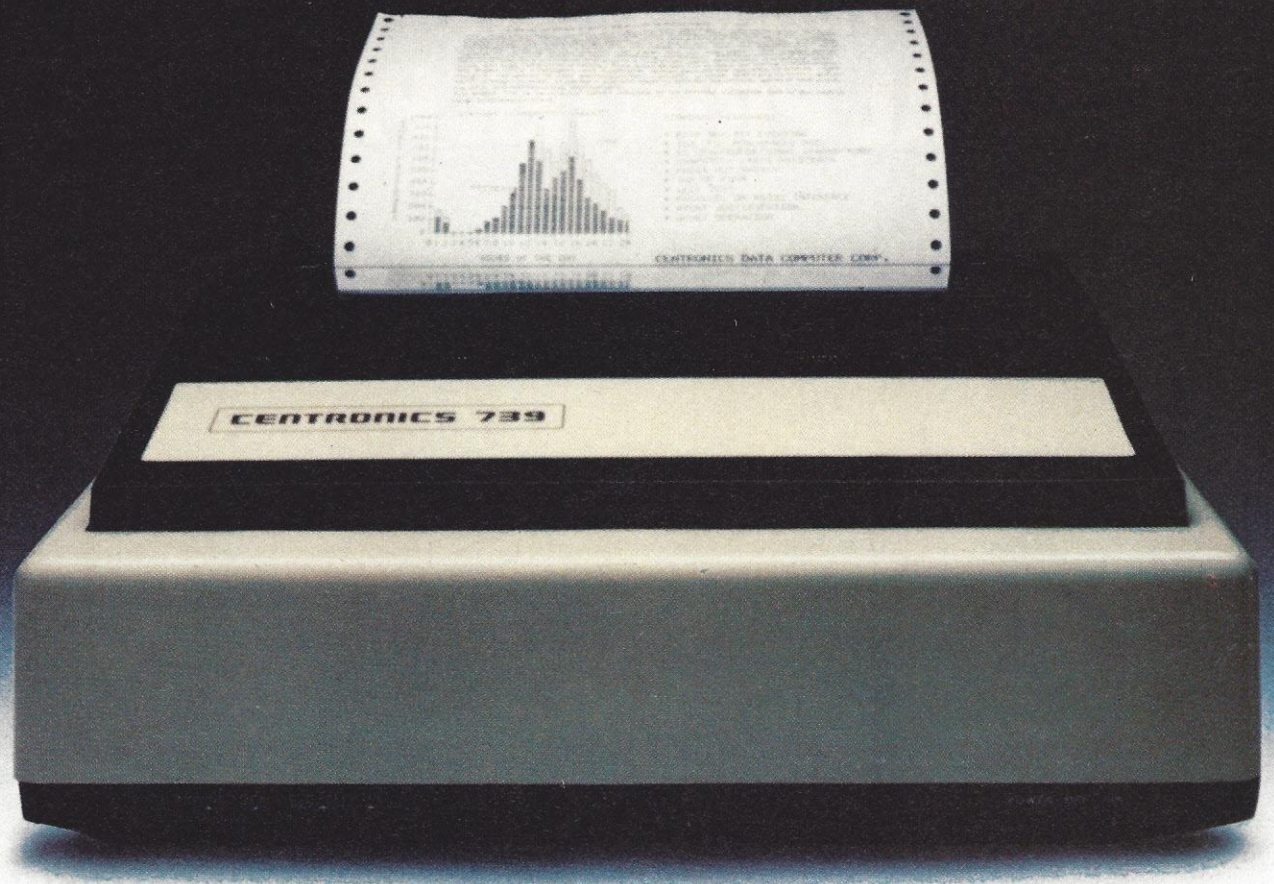

Inexpensive doesn't have to mean incomplete, and the quiet, dependable Centronics 739 is the classic example. It's complete in capability and because it's from Centronics you can expect it to perform just like the workhorse printers that have made Centronics a leader in the business for more than a dozen years. So when you shop for a desk-top printer and compare features, here's what you can expect from a 739:

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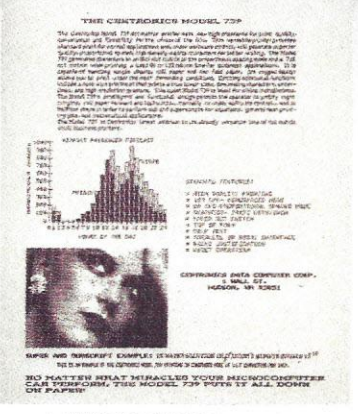

3-WAY PAPER HANDLING—Cut sheets for correspondence; roll paper for day-to-day operations; fan-folded forms for normal data printout.

DEPENDABILITY—You depend on your printer for hard copy of timely information and that means it must operate dependably. With Centronics reputation behind the 739, reliability is a foregone conclusion. More than 350,000 Centronics printers sold worldwide is the proof.

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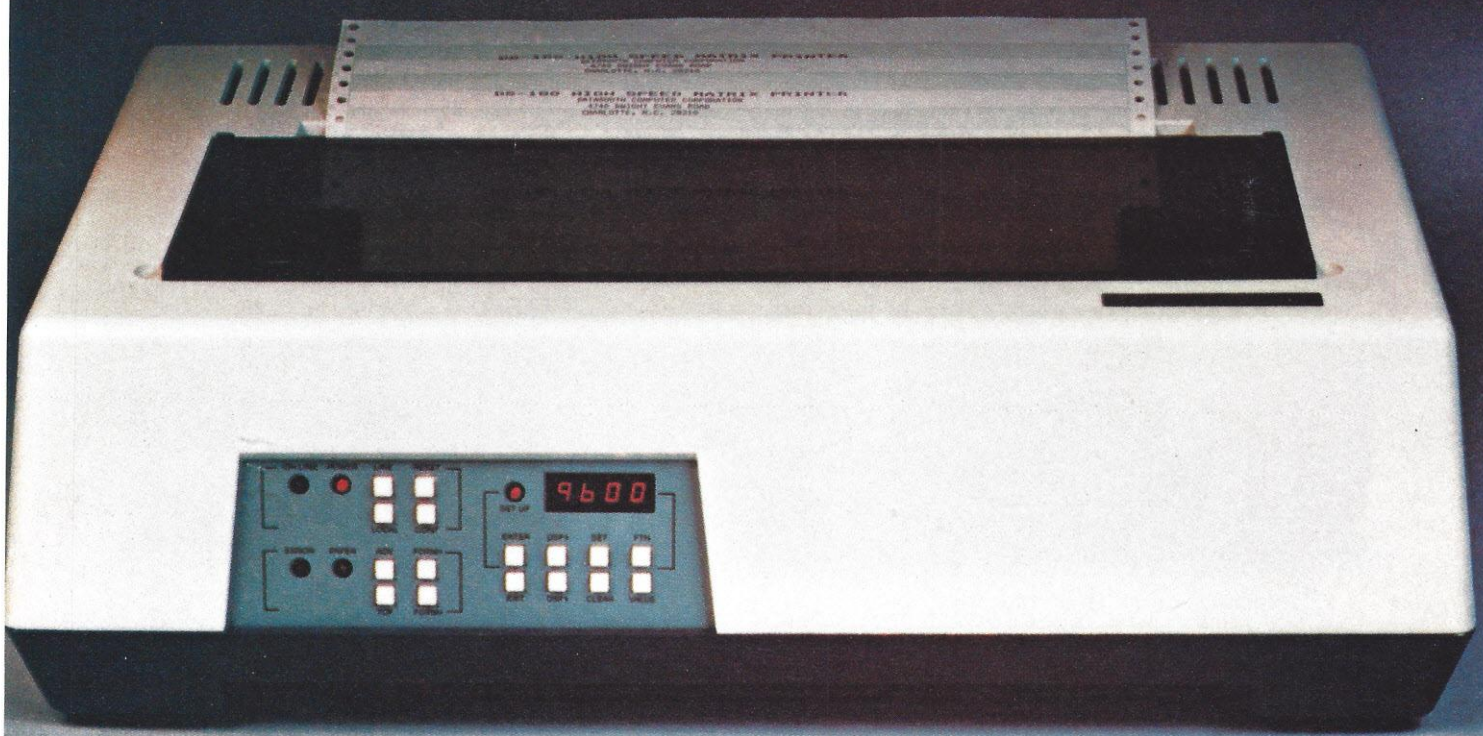

With so many matrix printers on the market today, it may seem tough to find exactly the right one for your application. Some models may offer the speed you need, others the communications flexibility and still others the forms handling capability. But no printer offers **all** the features you need... until now.

The DS180 matrix printer provides the total package of performance features and reliability required for applications such as CRT slave copy, remote terminal networks and small to mid-range systems. Not a "hobby-grade" printer, the DS180 is a real workhorse designed to handle your most demanding printer requirements. And pricing on the DS180 is hundreds of dollars below competitive units.

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Non-volatile Format Retention—a unique programming keypad featuring a non-volatile memory allows the user to configure the DS180 for virtually any application. Top of form, horizontal and vertical tabs, perforation skipover, communications parameters and many other features may be programmed and stored from the keypad.When your system is powered down, the format is retained in memory. The DS180 even remembers the line where you stopped printing. There is no need to reset the top of form, margins, baud rate, etc.... it's all stored in the memory. If you need to reconfigure for another application, simply load a new format into the memory.

Communications Versatility—The DS180 offers three interfaces including RS232, current loop and 8-bit parallel. Baud rates from 110-9600 may be selected. A 1K buffer and X-on, X-off handshaking ensure optimum throughput.

Forms Handling Flexibility—Adjustable tractors accommodate forms from 3"-15". The adjustable head can print 6-part forms crisply and clearly making the DS180 ideal for printing multipart invoices and shipping documents. Forms can be fed from the front or the bottom.

If you would like more information on how the DS180's low-cost total printer package can fill your application, give us a call at Datasouth. The DS180 is available for 30-day delivery from our sales/service distributors throughout the U.S.

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OUTLOOK

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There was no specific change relative to claiming the tax credit on the full cost of a system that included both hardware and software. However, if the tax credit is claimed on the software because the price is combined with the hardware, then the buyer must depreciate the software with the hardware. If the software is purchased separately, and is licensed rather than purchased, then the full software cost can be deducted in the year of acquisition.

New rules for defining leases: Taxpayers and the IRS have been arguing for years about whether a lease is really a lease or just a method of financing an equipment purchase. The new tax law attempts to simplify some of the complex rules that have cropped up in this area of controversy. Basically, the parties must clearly agree that the transaction is a lease, and the lessee must not acquire ownership of the property at any time during the lease. The lessor must be a corporation and must have an investment of at least 10 percent that is "at risk." Generally, the property must be new.

For further information: Research Press, P.O. Box 8137-P, Prairie Village, KS 66208.

Computerized biofeedback

When biofeedback emerged as a therapeutic process in the late 1960's, it was hailed as the quickest and most innovative way to cure stress to come along in years. But with time the method has become saddled with the reputation of being nothing more than a mixture of magic, thought-process control and blind faith.

One of its practitioners, though, the Peninsular Counseling Center in Tampa, Fla., is attempting, with the help of personal computers, to bring the mind-over-matter therapy out of the realm of voodoo and into the arena of accessible psychology.

Biofeedback is a clinical tool whereby patients cure their stress related illnesses—migraines, tension and sometimes more serious diseases—by controlling their build-up of stress. For example, migraines, it is felt, can be controlled by a patient if he increases the temperature of his fingertips. The theory is that the increased temperature dilates capillaries and lowers overall body tension.

During usual biofeedback sessions, patients are told of their progress by the repetitive tones of oscil-

OUTLOOK

lators. But at the Peninsular Center, an Apple II's video-display board and a Mountain Hardware Supertalker have replaced the old-style machine noise with a human-like voice and colorful displays. The Supertalker might say to the patient, "93.6 degrees and rising," and the patient—trained to react to the machine's stimulus—continues to augment his fingertip temperature while the computer's display board draws a picture of his progress.

Exactly how patients are able to alter their body temperatures by simply thinking them higher or lower, in response to a machine's prompting, isn't really known.

"We liken it to a car's speedometer," says Dr. Michael Rothburd, president of the Peninsular Center and the psychologist responsible for bringing the personal computer and biofeedback together. "A driver can control a car much better by watching the speedometer than by relying on other things to tell him how fast he's going. The speedometer doesn't control speed, but it offers a rapid feedback to judge it. Biofeedback works the same way for the human mind and body. It's a rapid feedback loop which is more sensitive than any other system we could use on an everyday basis."

And despite biofeedback's mysteries, Rothburd is certain that the Apple II system has generated quicker responses from patients, and beyond that, has improved the quality of the therapy.

"In the old days, people interested in biofeedback and its possibilities were mostly engineers led by their interest in electronics, oscillating machines, and other way-out stuff," he says. "But with the Apple, the equipment and therapeutic method becomes much more accessible, people like it, and aren't put off by it. Within our culture it is very common to lie down and relax in front of a color television set. That's essentially what our patients are doing now by working with the Apple during biofeedback sessions."

Rothburd also says that the beauty of having a talking machine is the ability to add at least the semblance of human interaction in what used to be totally machine-oriented therapy sessions.

The Center is experimenting with teaching Supertalker to speak in Spanish and also to use a woman's voice. "We're trying to mold the machine to what is more compatible to the patient," Rothburd says. "The Supertalker is flexible because it doesn't sound at all mechanical."

The Peninsular Center is clearly getting its money's worth from its personal computer. When the

Apple isn't in session with a patient, it scores psychological tests, is a partner for children's play therapy, and, perhaps most important, aids in analyzing the biofeedback sessions. After a session is over, results are drawn out in high-resolution graphics for review at the debriefing meeting which follows each treatment.

A retreading revolution

Retreading tires, long an imprecise procedure (the words themselves conjure up shifty salesmen dawning off wheels guaranteed to puncture upon contact with the road), is taking a giant step towards respectability at Tire Devices in Culver City, Calif. Jim and Kay Weir, who have been in the tire business for over thirty years, recently developed the Matrix Selector—a machine which uses an Apple II to exactly match used tires to proper size molds, resulting in a safer retreaded tire with a longer life.

"With the help of the Apple," Ms. Weir says, "we're making retreading the precision operation it has to be to succeed." Although the Weirs say that down the road the Matrix Selector will probably be used by new tire manufacturers as well, for the present the couple is concentrating on the retread industry.

The Selector, which communicates in both English and Spanish, works this way: An operator mounts the used tire on the machine, which measures its size and identifies which shop mold should be used for retreading. The Apple II then monitors the buffing, and shows the operator when the tire has been buffed down to the correct parameter.

The machine was originally conceived in 1977 by the National Tire Dealers and Retreaders Association, which financed its research and development. Attempts to improve the mold matching and buffing process had been tried before, but they had failed until the computer was introduced to the process.

Since the Matrix Selector was introduced last year, the Weirs have "been inundated with calls and letters from around the world" from retreaders who want to try out the machine. So far four systems have been installed in the U.S.

Fixed-formats

continued from page 97

strings CR$, ES$, LA$, and RA$. (X is the line number for the outer loop.)

Some "bells" and "whistles" that may make your particular application more friendly include checking that the character input is alphabetic. Applesoft has a string function called ASC(A$), which returns the ASCII code for the first character of the string A$. One of several possible data-verifying routines is shown in figure 8 (page 148). This will branch if and only if the input is a typewriter-keyboard character. If input is limited to the alphabet, then the code should check that the ASCII value is between 65 and 90, inclusive. If upper- and lowercase characters are being entered, check the ranges 65–90 (for uppercase) and 193–218 (lowercase), because the computer's internal values differ by 128 for upper- and lowercases.

For more substantial data entry, allow for revision of a data set—during both the actual entry and at some later time (mistakes may be made on entry or addresses may change). It's easy to display a particular set of entries and revise them when the name, number, and zip are stored as a block unit—find the index value (i.e., the matrix or array subscripts) and print that particular set so changes can be made. The easiest way to do this is to loop through the data set at a high printing speed without user input or prompting. The escape key can interrupt the loop and the data can be indexed by the newly found subscript. Save the information on disk or tape if the entry is a lengthy process so it doesn't have to be retyped. Such information can be used in different formats: The data could be sorted by different fields, or recovered for mailing labels, billings, or automatic telephone dialing.

So far the data entry has involved only characters. Let's assume we wish to enter numerical data into a matrix format similiar to VisiCalc's. Specifically, this type of entry will be demonstrated for what is known as a "node incidence" matrix. This matrix represents paths from a location indicated by the row index to the location indicated by the column index. For example, (3,2) means the path from the third position to the second position. The value of (3,2) indicates the cost or length of the transition from 3 to 2; if there are "1" or "0" entries, it indicates the presence or absence of the path itself. These matrices are often symmetrical (i.e. entry 3,2 is

identical to 2,3); for simplicity, it will be assumed that this is the case, and that entries into this matrix are either 0's or 1's. The diagonal is irrelevant, but is usually empty (with "0" entries).

As with character entry, we need to activate the arrows, the escape key, and probably the carriage return. In this example, the fields are not ragged—they're a structured latice consisting of every other row and every other column. The subroutines in figure 9 (page 148) have a driver (lines 1 to 599) from a network-minimization program, where the network is represented by the node-incidence matrix. The arrows are active, but are not row-dependent. The data are entered by row, top row first, and in fixed fields on the screen with a moving cursor. If an entry in row 1 is in error and the cursor is in row 2, backspacing will move the cursor into the upper row. Likewise, the right arrow will advance the cursor into the next lower row.

The arrows preserve the values of the individual entries, even though the cursor skips across several entries or rows. This is known as a non-destructive cursor. A carriage return serves the same function as entering a "0"in all but the initial entry stage, when the escape key is functional. It probably should serve to move the cursor up and down entire rows as it does in the string data-entry routine (figure 4, page 148). In some cases it's easier to have a large-size key in a convenient location than to move the cursor to different rows. If this is an important feature to have, follow the example of the character entry, or move from one row to another by incrementing the *outer* loop counter. A window is set so that the matrix will not scroll off the screen, and so that information is entered into the matrix in a meaningful way. After all, the purpose of fixed-field entry is to make input of information easy.

The instruction set in figure 10 (figure 149) moves the cursor to line 19, clears the screen from that point downward, and then moves the cursor to line X, position 1 for a print statement. This line may be redundant, but it prevents new output from partially overwriting older lines, and the problem is imbedded somewhere in 600 lines of BASIC code. The trace option is not helpful for debugging when output is being written to specific locations; the trace line numbers overwrite each other and cannot be read.

The loop routine is shown in figure 11 (page 149).

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CIRCLE 58

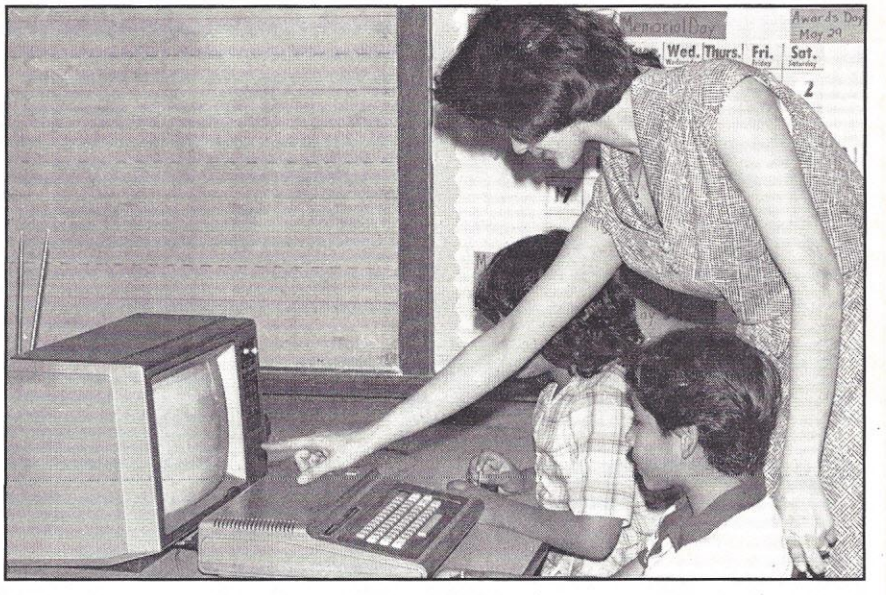
Thorwald Esbensen

Personal computers: the golden mean in education

Back to basics, or comprehensive learning? The personal computer can bring together the best aspects of these teaching techniques

This decade's cry for a return to basics in education was promptly counterchecked by proponents of imaginative and comprehensive teaching approaches. The controversy, though it may contribute to the search for effective educational techniques, may be wide of the mark in attempting to promote one method at the expense of the other.

The personal computer, a flexible and interactive learning tool, may serve as a middle ground where the best of both worlds is realized.



Drill and practice

To what extent can personal computers assist in the attainment of needed facts and skills? During the 1979–80 school year, a small instructional project in Edina, Minn., attempted to provide a partial answer to this question.

Third and fifth graders in the Edina public schools are given the Iowa Tests of Basic Skills on a yearly basis. In the fall of 1979, students in four elementary schools who scored low in capitalization, punctuation and word usage were assigned to additional work, using personal computers as the major source of instruction. A series of programs previously written for the PET—employing a standardized-achievement-test format—was used to familiarize students with the computers.

Seven months later, in the spring of 1980, these students were re-tested. Group gains ranged from 20 to 31 months over this period. Although it can't be said that the personal computers were solely responsible for these gains, it seems reasonable to conclude that they had a beneficial effect on student achievement.

This does not, of course, diminish the force of what the critics of drill and practice are saying. There are powerful and imaginative instructional uses to which personal computers can be put—activities that lie considerably beyond the scope of repetitive practice.

For example, as the 1980 presidential election approached, a program called Hat in the Ring was written for Edina grade-school students. In this political exercise, two players (or groups of players) could take the parts of the Democratic and Republican presidential candidates. By making various decisions during a simulated campaign, each candidate would attempt to gain the political advantage over his opponent. The choices involved such matters as how much attention to devote to domestic issues as opposed to international affairs, what resources to commit to media exposure or personal campaigning, and in which states. (It didn't take long for students to discover that going after the electoral votes of California and New York was a crucial part of the campaign.)

Students could also use personal computers to make decisions with respect to designated problem-solving activities. For instance, students might (with teacher assistance) de-

cide what kind of formula would best assist in determining when a new car should be purchased to replace an old one (taking into account such things as depreciation, gas consumption, needed repairs, driver purpose, etc.). The instructor could then work with the students to show them how a personal computer could be programmed to help solve the car-replacement problem.

Why learn programming?

The students themselves could be taught how to program a computer for their own purposes. In this connection, "computer literacy" has been receiving a great deal of attention from school people. The idea is that, because our children are going to grow up in a society increasingly dependent upon computers in one form or another, it makes sense to acquaint students with the technology that will so powerfully affect their lives. But the argument for this particular form of computer literacy does not impress all. The dissenters point out that to drive a car, you do not need to know what is under the hood. Likewise, you can use a computer without knowing how to program it.

Nevertheless, learning at least something about the rudiments of programming is one way of quelling the fear that many people have concerning computers. It tends to put things into some sort of reasonable perspective. As Dorothy and her friends discover, behind the facade of the Wizard of Oz is—Frank Morgan.

Two years ago, a programming course was begun with elementary school students in Minnesota. The language used was PET BASIC. An instructor met once each week for one-hour sessions with small groups of youngsters from various elementary schools. By last year, it became clear that the student who was the best computer programmer in the entire school system (including senior high school) was a third-grader named Paul Falstad. Paul, who was 9, entered a programming contest for the Minneapolis/St. Paul Metropolitan Region and, in competition with senior high school students, took first place in the computer games category. Paul's success serves to illustrate that children of surprisingly tender years can learn computer programming.

But such applications do not eliminate the ongoing need for drill and practice routines. These routines can usefully conserve a teacher's time

continued on page 120

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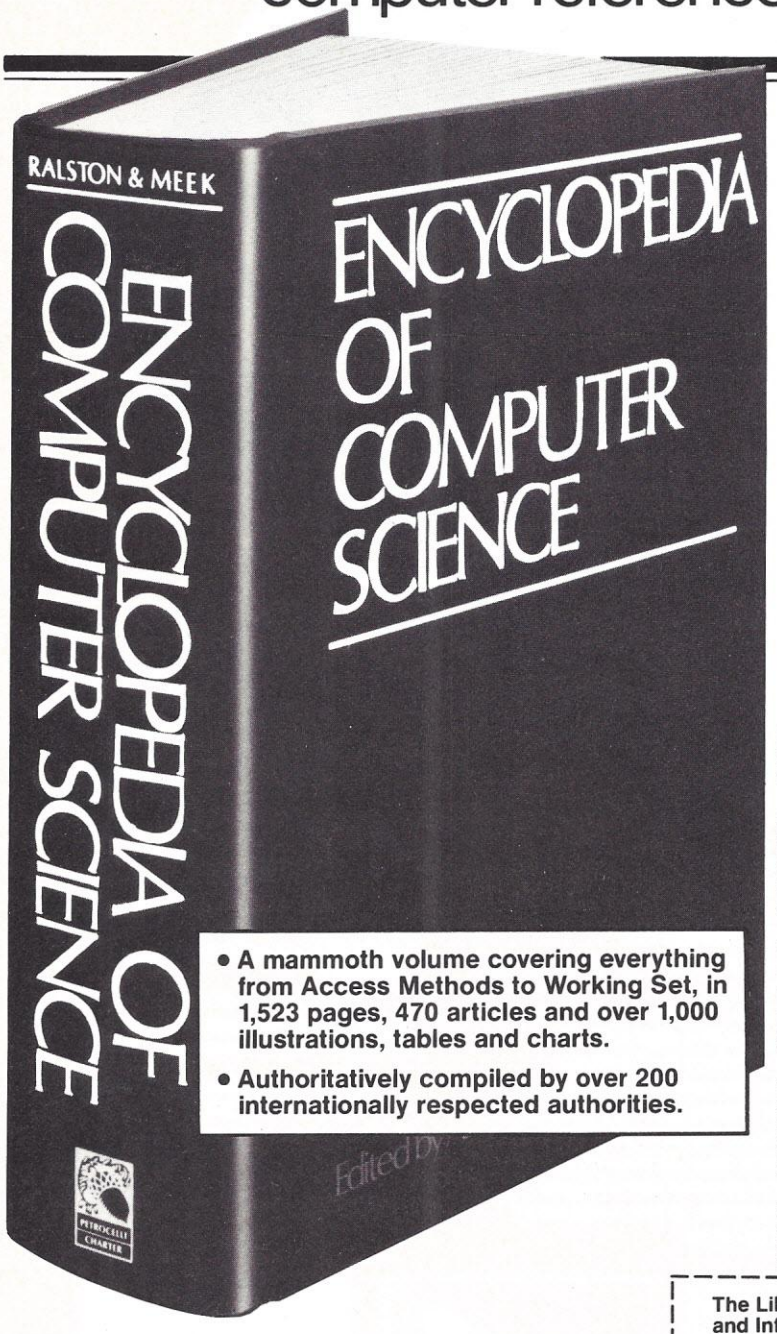

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CIRCLE 61

The $149.95 personal computer.

Introducing the Sinclair ZX81

If you're ever going to buy a personal computer, now is the time to do it.

The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only $149.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers

The ZX81 is a major advance over the original Sinclair ZX80—the world's largest selling personal computer and the first for under $200.

In fact, the ZX81's new 8K Extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only $39.95, plus shipping and handling—complete with new keyboard overlay and the ZX81 manual.

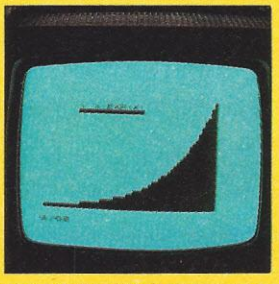
So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

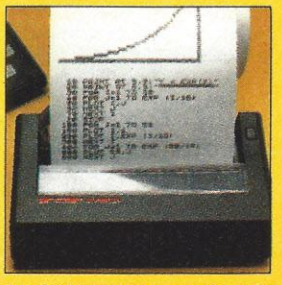
Warranty and Service Program**

The Sinclair ZX81 is covered by a 10-day money-back guarantee and a limited 90-day warranty that includes free parts and labor through our national service-by-mail facilities.

**Does not apply to ZX81 kits.

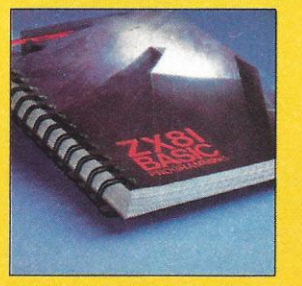


NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



ZX PRINTER: The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than $100.

16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is $99.95, plus shipping and handling.



ZX81 MANUAL: The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A $10.95 value, it's yours free with the ZX81.

The $99.95 personal computer.

Introducing the ZX81 kit

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just $99.95.* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

How to order

Sinclair Research is the world's largest manufacturer of personal computers.

The ZX81 represents the latest technology in microelectronics, and it picks up right where the ZX80 left off. Thousands are selling every week.

We urge you to place your order for the new ZX81 today. The sooner you order, the sooner you can start enjoying your own computer.

To order, simply call our toll free number, and use your MasterCard or VISA.

To order by mail, please use the coupon. And send your check or money order. We regret that we cannot accept purchase orders or C.O.D.'s.

CALL 800-543-3000. Ask for operator #509. In Ohio call 800-582-1364. In Canada call 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. For information, you must write to Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

sinclair

AD CODE PC-11

	PRICE†	QTY.	AMOUNT
ZX81	$149.95		
ZX81 Kit	99.95		
8K BASIC chip (for ZX80)	39.95		
16K Memory Module (for ZX81 or ZX80)	99.95		
Shipping and Handling	4.95		$4.95
To ship outside USA add $10.00			
		TOTAL	

MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

† U.S. Dollars

continued from page 116

and energy and provide a kind of individualized instruction helpful to students who are having trouble learning certain facts and skills. Nor is there any reason why repetitive exercises have to be dull. Even with an unadorned format, learning via computer-assisted instruction is often interesting. Perhaps this is due mainly to the fact that this form of learning is *interactive*: The student responds to the computer and the computer responds to the student. The arrangement tends to keep a learner on task, and sustained attention appears to have a positive bearing on academic achievement.

Educational games

Instructional drill-and-practice programs have increasingly been enhanced by the use of games designed to maintain student interest. These may be divided into two types: games whose features are not directly related to what is being learned and games that are an integral part of what is to be learned.

An example of the first type of game would be tic-tac-toe, appended to math-drill exercise for two players. Each player takes turns answering math problems. Each correct answer earns the player the right to make a move on the tic-tac-toe board.

An example of the second type might be a computerized word-puzzle game. The student solves the word puzzle by working with the words that constitute the learning assignment. This type of game would probably appeal to most of us as being the more appropriate format because its game-like features are integrated with the subject matter. The first game seems to be something foreign, grafted onto the main body of the material to be learned. However, evidence does not suggest that one type is superior to the other in terms of getting better student accomplishment.

The critics of drill-and-practice assignments contend that a narrow reliance on learning tasks requiring only recall and recognition is a poor way to prepare students for coping with life. The trouble is that this perfectly valid criticism is sometimes stretched to include any instructional arrangement that does not make the learner engage in higher-level mental activities. But basic low-level skills that require practice (and lots of it) for their development are essential tools for living.

North Star's new advantage

North Star's Advantage is a graphics computer supplying a balanced set of business, word, or scientific data-processing capabilities along with both character and graphics output.

Costing $4000, the Advantage is a 43-pound integrated package including a Selectric-style keyboard and numeric keypad, high-resolution green phosphor monitor, 64k RAM, and two double-sided, double-density disk drives with 720 kbytes of storage.

With the Advantage, North Star has made an effort to score well in several ergonomic (human engineered) areas. Green phosphor screens offer more than a cosmetic advantage over black and white, in that they reduce eye strain.

The computer's Selectric-style keyboard also scores high in ergonomics, as nearly every rapid typist suffers a dramatic drop in speed when he uses any other kind of keyboard. The touch and sound of the Advantage keyboard was also designed to emulate an IBM typewriter.

Another main ergonomic area consists of the user-friendliness of a detachable keyboard and a tilt/swivel monitor. And the Advantage is compact so it takes up just a little more space than a conventional typewriter.

An additional feature of the Advantage is that the numeric keypad can be toggled to provide full cursor control, including diagonal movement.

North Star plans to support a wide variety of telecommunications and expansions from the Advantage. Their ultimate goal is for the machine to be the basic unit in a large company's multi-tier system. The various units would communicate with multi-user Horizons, which in turn would communicate with mainframes as needed. Six slots are built into the hardware for expandability purposes.

CP/M or North Star's own operating system is available with the Advantage, which uses a second microprocessor to offer graphics capability not usually linked with a CP/M machine.

Each Advantage come with a demonstration diskette containing diagnostics, Busigraph and a graphics demo package. With the Busigraph the user can create, from a menu, line, bar, pie and three-dimensional charts.

Either of the available operating systems allow the user to address any or all of the 240×640 pixel grid. The display is controlled by 20k of display-dedicated RAM in addition to the 64k RAM in the main memory. And even while running CP/M, the computer has 56k RAM available to the user.

The diagnostic software that is available with the Advantage does a short integrity check each time the program is booted, with a more lengthy check available on the same diskette. This tells the user if the machine is working properly before he starts work on it.

North Star's own operting system makes existing Horizon software available to the Advantage user including: order entry, invoices, inventory control, general ledger ($1000 each); accounts receivable and accounts payable ($600 each); word processing ($400); and mailing-list management ($300.).

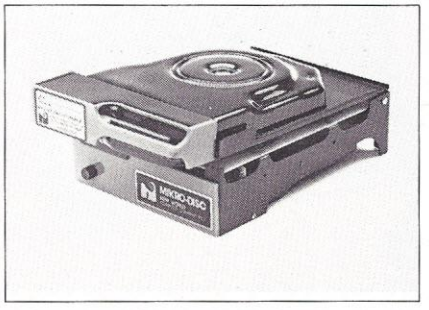
For more information: North Star Computers, 14440 Catalina St., San Leandro, CA 94577; (415) 366-7001.

CIRCLE 142

INPUT/OUTPUT

Cartridge Drive

The Mikro-Disc V drives, 5¼-inch fixed- and removable-cartridge drives, are available in five models. The drives range from the Model 2/0 Winchester drive with 2 megabytes of fixed storage, to the Model 4/4, with 4 megabytes fixed, and 4 megabytes removable storage.



The removable cartridge is available in 2-megabyte and 4-megabyte versions and comes with New World's multiple-head assembly, media and actuator positioner.

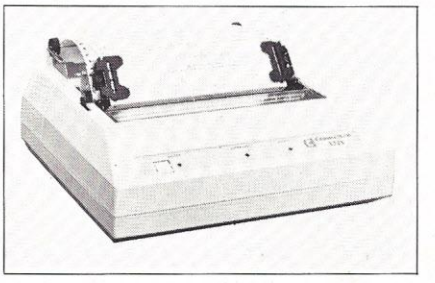
Prices start at under $500 for the Model 2/0 and under $1200 for the Model 4/4.

For more information: New World Computer, 3176 Pullman St., #120, Costa Mesa, CA 92626; (714) 556-9320. **CIRCLE 150**

Parallel Printer

The Model 3715 microprocessor-controlled, impact parallel printer for Cromemco systems prints 9 x 7 dot-matrix characters at a rate of 150 characters-per-second. The printer can print both upper- and lowercase characters and also has a character set for French.

Character densities of either 10 characters-per-inch or 16.36 cpi are available. Up to 80 characters-per-line can be printed at 10 cpi, and up to 132 cpl can be printed at 16.36 cpi in line lengths up to eight inches.

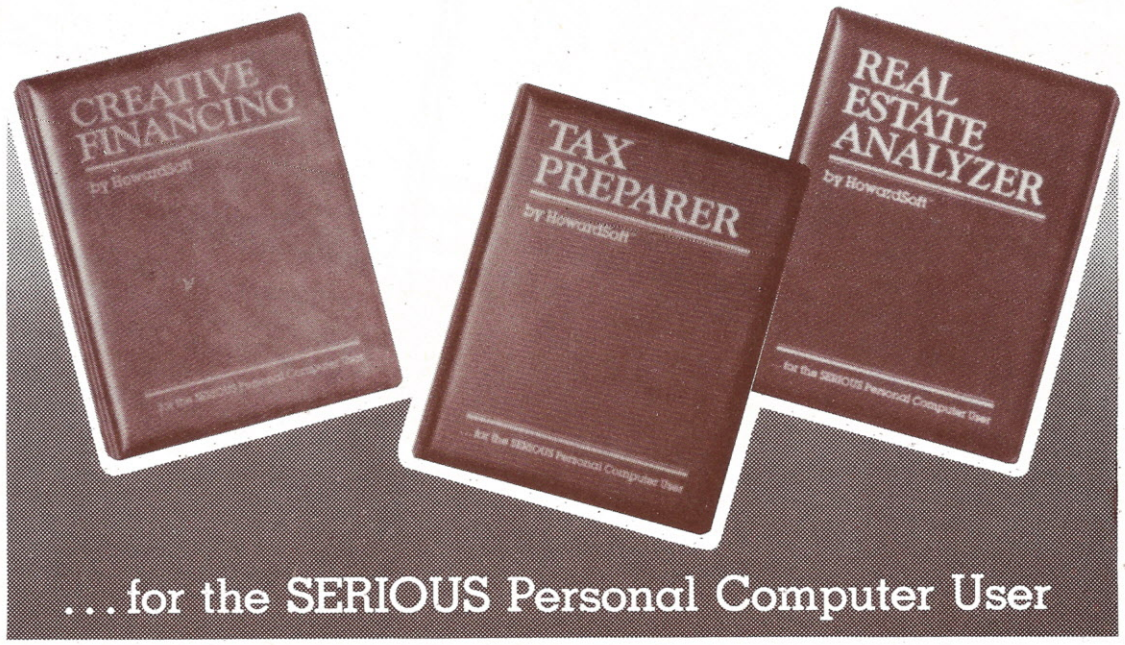


The 3715 has a three-way paper-handling system which accepts 9½-inch wide standard computer-fanfold forms, 8½-inch wide roll paper, and 8½-inch wide single sheets.

The price is $1295.

For more information: Cromemco,

THE PROFESSIONALS' CHOICE



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A package for year-long record-keeping and year-end tax filing; prepares returns for several forms & all schedules using on-screen facsimiles; prints in IRS format for filing; buy now and purchase low-cost updates at year end.

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A tool for objectively comparing alternative investments and projecting future results; professional in both analyses of cash flow & R-O-I and client-oriented report printouts; allows what-if studies for changes in economy, loans, rents, taxes, & more .

CREATIVE FINANCING by HowardSoft:
A flexible package for evaluating real-life loans & investments; provides cash flow & R-O-I projections as well as payment tables and objective decisions; can be used for yield to maturity of discounted bonds, present value of future income stream, buy vs. lease decisions, APR of loans, & much more .

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CIRCLE 65

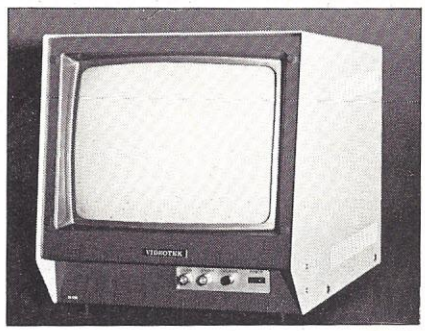
280 Bernardo Ave., Mountain View, CA 94043; (415) 964-7400. **CIRCLE 151**

Video Terminal

The VT125 is a video terminal with data-plotting and business-graphics capabilities. The terminal is designed for use in business, laboratory and scientific graphics applications. It can display pictures and shapes, plotted trend lines, bar charts, pie charts, point-plot graphs, and continuous data plots.

Typical applications include generation of sales progress charts, financial-distribution bar graphs, resource-division diagrams, and presentation of data histograms.

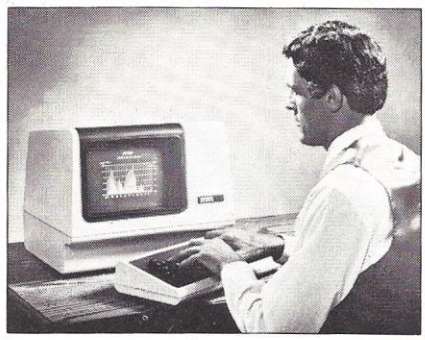
The price is $3800.



For more information: Digital Equipment, Maynard, MA 01754; (617) 493-2777. **CIRCLE 152**

RGB Monitor

The CD-13HR is designed for color display of text, graphs, plots, diagrams and medical applications. The monitor features a 13-inch black matrix CRT capable of displaying 2000 characters.



The monitor has full range analog-signal input and video-channel bandwidth of 50Hz to 20MHz.

The price is $2435.

For more information: Videotek, 125 N. York St., Pottstown, PA 19464; (215) 327-2292. **CIRCLE 153**

PERIPHERALS

Memory Expansion

The Ramex 16, a memory expansion board for Apple personal computers, allows memory expansion through slot zero and will hold BASIC as well as Pascal and FORTRAN.

The price is $129.95.

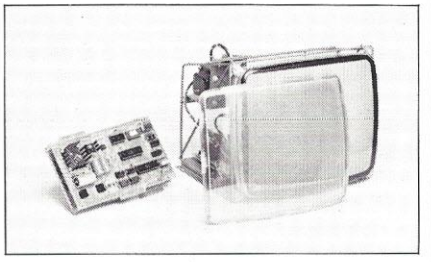
For more information: Omega MicroWare, 222 S. Riverside Plaza, Chicago, IL 60606; (312) 648-1944.

CIRCLE 154

Screen Panel

The high-resolution Touch Screen makes it possible to access a data base by simply touching the screen.

The Touch Screen consists of a thin, transparent curved panel that mounts on the front of most standard CRT displays, and an electronic board that is connected to the panel with a cable. The screen is offered in 12- and 15-inch models.



The price for the 12-inch model is $775, and the 15-inch model is $825.

For more information: TSD Display Products, 35 Orville Dr., Bohemia, NY 11716; (516) 589-6800. **CIRCLE 155**

Video Imaging

Dithertizer II, a picture-transmission device for the Apple II, converts input into dithered (confused) images. This produces the appearance of gray scales on the screen.

With the press of a key, the Dithertizer can produce shaded or black and white images, freeze an image, and produce a variety of contour images. Scenes can also be saved and recalled from the disk.

The price is $650.

For more information: Peripherals Plus, 39 E. Hanover Ave., Morris Plains, NJ 07950; (201) 540-0445.

CIRCLE 156

Graphics Conversion

The Model VT640S is a 640 X 240

Hayes Stack™

Microcomputer Component Systems

At Hayes, we don't believe in second best. Or planned obsolescence. We believe in taking the state of the art to the limit. Our new Smartmodem, for example, is the most sophisticated 300-baud originate/answer modem you can buy. And yet, it is perhaps the easiest-to-use modem ever.

RS-232C Compatible. Smartmodem lets any RS-232C compatible computer or terminal communicate by phone with other computers and time-sharing systems located *anywhere in North America*. You get full and half-duplex operation with both Touch-Tone* *and* pulse dialing.

Auto-Answer/Dial/Repeat. Smartmodem can answer the phone, dial a number, receive and transmit data, and then hang up the phone – automatically! If desired, Smartmodem will even repeat the last command. You can depend on Smartmodem for completely unattended operation.

Completely Programmable. Smartmodem can be controlled using *any* programming language. Over 30 different commands can be written into your programs or entered directly from your keyboard.

Smartmodem also includes several switch-selectable features that let you tailor performance to your exact needs. You can "set it and forget it" for the ultimate in convenience.

Built-in Audio Monitor. Thanks to an internal speaker, you can actually listen to your connection being made. You'll know immediately if the line is busy or if you reached a wrong number – *and you don't even need a phone!*

Status at a Glance. Seven LED's indicate Smartmodem's current operating mode: auto-answer, carrier detect, off hook, receive data, send data, terminal ready and modem ready. You're never left in the dark!

Direct-Connect Design. Smartmodem is FCC registered for direct connection to any modular phone jack – there's no acoustic coupler to cause signal loss and distortion.

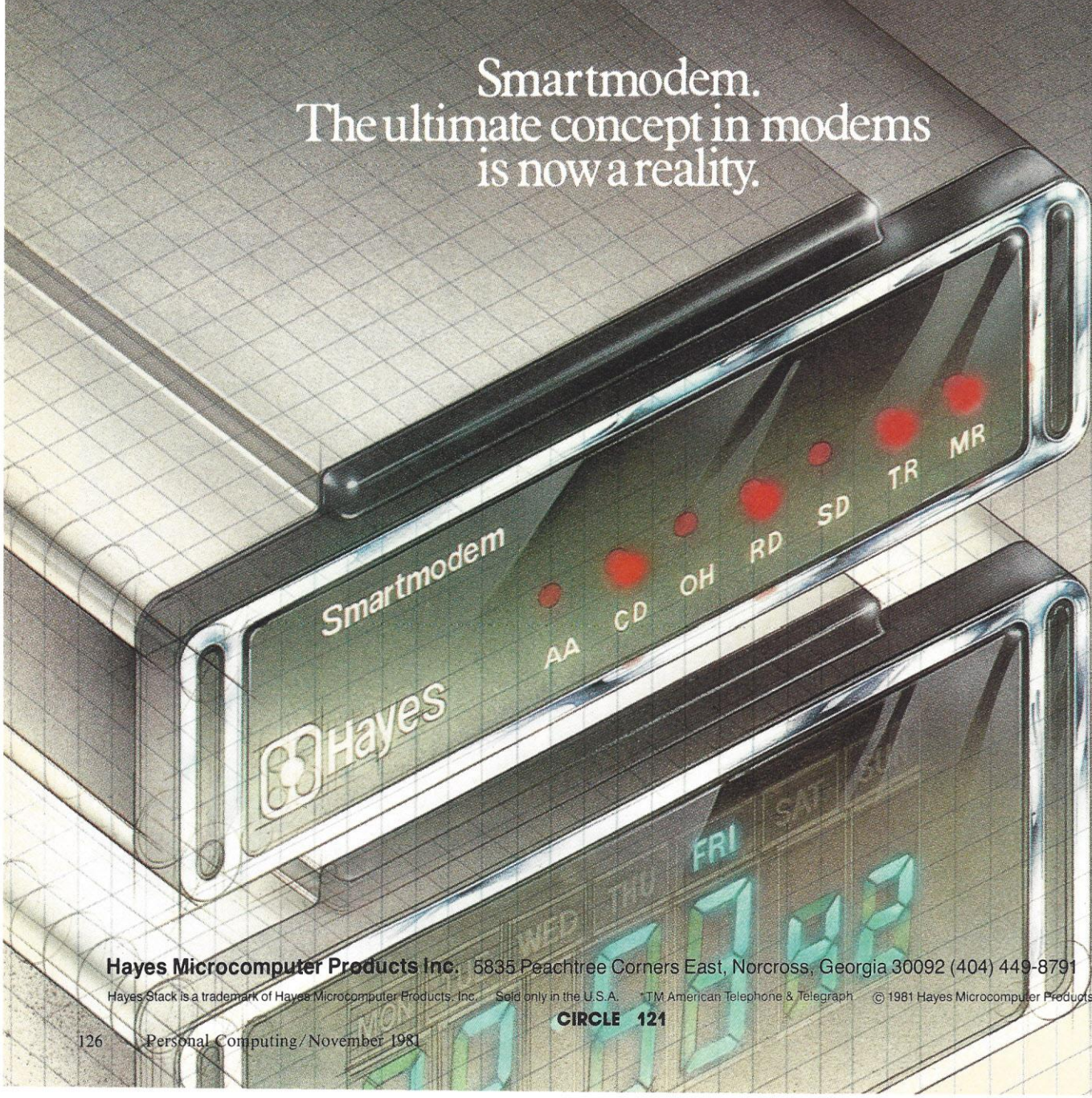
Smartmodem, Smart Buy. Professional quality features. Versatile performance. A full two-year limited warranty. A suggested retail price of only $279.

What more could you want? Perhaps the matching Hayes Stack Chronograph, an RS-232C compatible calendar/clock system.

Check out the Smartmodem wherever fine computer products are sold. And don't settle for anything less than Hayes.

Hayes

Smartmodem. The ultimate concept in modems is now a reality.



Hayes Microcomputer Products Inc. 5835 Peachtree Corners East, Norcross, Georgia 30092 (404) 449-8791

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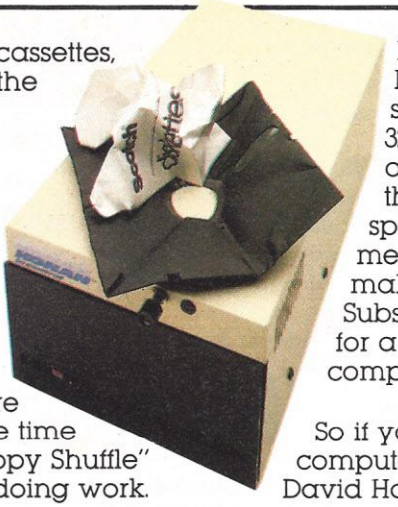
CIRCLE 121

Stop the Floppy Shuffle

Announcing
The David Hard Disk Subsystem



Compared to cassettes, floppies were the greatest thing since integrated chip. But with increased applications, data bases, and speed requirements, a lot of business people are spending more time doing the "Floppy Shuffle" and less time doing work.

Now with Konan's David Hard Disk Subsystem you can have 32 times the storage of a mini-floppy in about the same amount of space. At a cost per megabyte that really makes sense, the David Subsystem is available for a variety of microcomputers.

So if you own a personal computer, check into the David Hard Disk Subsystem at your local dealer and stop doing the Floppy Shuffle. And if you want real timesharing capabilities, a networking card is available.

The David Subsystem is available immediately.

Toll-free Information Line

800-528-4563

KONAN™

KONAN CORPORATION
1448 NORTH 27TH AVE, PHOENIX, AZ 85009
(602) 269-2649, TWX/TELEX 9109511552

CIRCLE 69

resolution Retro-Graphics conversion package for the DEC VT100 alphanumerics terminal.

Once installed by the user, the VT640S enables the VT100 terminal to perform as an alphanumerics terminal and as a graphics terminal. Operation features include vector drawing, point-plotting, mode-independent selective erase, cross-hair cursor, an optional light pen and printer interface.

The Retro-Graphics VT640S costs $1230.

For more information: Digital Engineering, 630 Bercut Dr., Sacramento, CA 95814; (916) 447-7600. **CIRCLE 157**

INTERFACES

Color Cartridge

The CMEMORY plug-in cartridge for the TRS-80 Color Computer gives the user 8k of continuous memory. This memory can be divided into any combination of 2k blocks of RAM and/or 2716 EPROMS.

The CMEMORY with RAM installed is used for storing copies of the video screen or machine-language subroutines in BASIC programs.

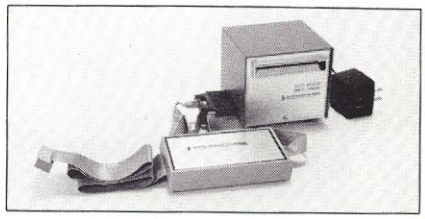
The CMEMORY cartridge without memory costs $24.95, 2k RAM chips are $19.95 each, and 2k 2716 EPROMs are $14.

For more information: Micro-Labs, 902 Pinecrest, Richardson, TX 75080. **CIRCLE 158**

Card Readers

A special interface to the TRS-80 Model III for MR 500 and OMR 500 card readers plugs into the I/O bus jack of the Model III.

A software driver is provided with the reader and the interface. It enables the user to easily input data in two formats: ASCII equivalent code or the image of the data.



The MR 500 uses an electric-current technique for reading, and thus can only read a soft pencil mark. The OMR 500, however, is an optical reader that not only reads marks but scans cards containing punches, pre-printed and mark-sense data.

The MR 500, including interface and driver, costs $750. The OMR 500 costs $1095.

For more information: Chatsworth Data, 20710 Lassen St., Chatsworth, CA 91311; (213) 341-9200. **CIRCLE 159**

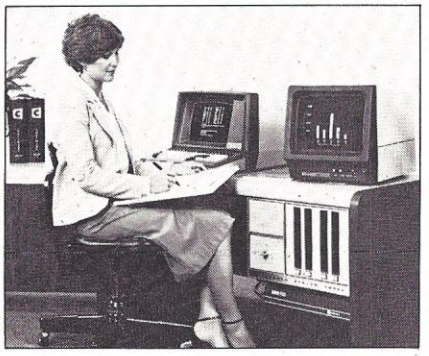
BUSINESS

Graphics Packages

High-resolution color graphics systems are available with a variety of software packages.

The Slidemaster software package can create images interactively. The menu provides pen and brush selections; a color pallet; the capability to generate circles, ellipses, lines and text; and zoom and pan functions. Once the images have been created and stored on disk, they can be displayed "slideshow" fashion.

Fontmaster is a character-generator software package which allows the user to interactively design his own fonts (character set). The special font terminal emulator allows the user to enter text right from the keyboard to the RGB monitor as if it were a terminal. Fontmaster comes with 10 character files which include styles such as Rondo, Radiant, Bembo Italic, and Cheltenham.



A software-development package for the graphics systems is also available. It includes a full range of human-oriented commands that operate from high-level languages such as BASIC, FORTRAN, and RATFOR. Various subroutines in the package allow capabilities including: fast line generation, fast generation of regular shapes, area fill of shapes in a designated color at video rates, and text generation and rotation.

Each package costs $595.

For more information: Cromemco, 280 Bernardo Ave., Mountain View, CA 94043; (415) 964-7400.

CIRCLE 160

Equipment Tracking

Atlas 1200, an equipment maintenance program, allows office-machine and computer dealers to track each piece of equipment as it is sold, leased or rented.

The program maintains standard customer information, including maintenance charges and aged balances. Each piece of equipment is tracked by model number and serial number. Territory, type of service plan, length of service plan, relevant install-date information with meter readings, and monthly, quarterly,

semi-annual and annual pricing are also stored.

Management reports include: equipment-to-territory listing, customer list with equipment, plan expiration, revenue, projected revenue by period, cost-of-service history, and model analysis.

Atlas 1200 runs on the Commodore CBM and costs $750.

For more information: Cimarron, 666 Baker St., Suite 319, Costa Mesa, CA 92626; (714) 641-1156.

CIRCLE 161

Financial Package

Creative Financing, a software package for evaluating loans and investments, produces tabular printouts that provide payment and depreciation schedules and information on the projected profitability of investments.

Capabilities of the software include computation of return-on-investment, internal rate-of-return, net present value, equivalent compound-interest rate, and after-tax cash flows. The package can also be used to evaluate wraparound mortgages, complex value of annuities, and ownership versus sale-leaseback decisions.

The package is available on disk for the Apple with 48k and Applesoft. The retail price is $150.

For further information: Howard Software Services, 6713 Vista del Mar, La Jolla, CA 92037; (714) 454-5079. **CIRCLE 162**

Cost Estimating

The Manufacturing Cost Estimate (MCE) and the Discounted Cash Flow (DCF) systems are designed for manufacturing, engineering, consulting and analytical applications.

The MCE package allows the user to estimate detailed manufacturing costs based on individual specifications, and to enter changes in unit costs. Thus, up-to-date listings can be produced. The information is organized under both fixed and variable costs and includes categories such as labor, utilities and raw materials.

The DCF package is designed for corporate managers, financial advisors, certified public accountants, tax consultants, and real estate and building analysts. Its applications include detailed cash flow, rate-of-return and payback, and escalation of income and individual costs.

Both packages run on Apple II, TRS-80 and CP/M systems. The prices are: MCE, $75; DCF, $125; and both packages, $149.

For more information: Centec Pro-

cess Systems, Centec Bldg., 11260 Roger Bacon Dr., Reston, VA 22090; (703) 471-5999. **CIRCLE 163**

UTILITY

Word Processing

Writemaster software is a display-oriented word-processing program that has a command structure to approximate the flow of natural language.

The program features commands and single-keystroke functions to ease document creation. Additional features are: user HELP command; automatic command-input spelling correction; and file maintenance from within the program.

The text displayed on the screen will be output at print time with no hidden printer controls or changes in the text altering the appearance of the final product.

Some of the text-formatting commands include: alignment of the left margin of all or any part of a specified text; and left or right justification of the text with optional incremental spacing. Other commands are: automatic word wrap; automatic page-boundary display; variable line spacing; page numbering and heading insertion; line centering; and single-key alignment.

Text-editing features include: find and replace capability; variable speed-file scanning; jump-to commands; temporary storage and movement of text-insertion from disk files; and block-storage of text subsections to disk.

The software package costs $595.

For more information: Cromemco, 280 Bernardo Ave., Mountain View, CA 94043; (415) 964-7400. **CIRCLE 164**

Data Exchange

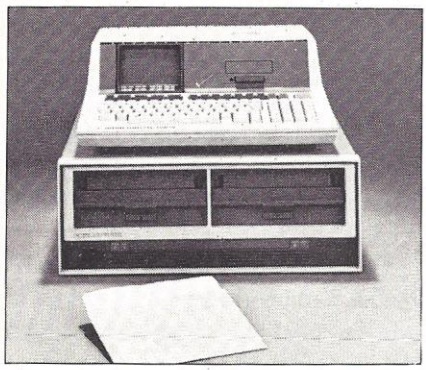
The Data Exchange Utility software package allows users of the HP Series 80 to exchange data with larger computer systems via 8-inch flexible disks.

The software works with the HP 9895A 8-inch flexible disk drive to transfer character data between an HP-85 or HP-83 and large computer systems that have IBM 3740 formatting for 8-inch flexible disks.

Data can be recorded on disk, converted to 3740 format, and loaded into a larger centralized computer system for processing.

A CRT menu and specially defined function keys allow the user to transfer a file or a set of files, catalog a

disk, purge or rename any file, and initialize a disk.



The price is $95.

For more information: Inquiries Manager, Hewlett-Packard, 1507 Page Mill Rd., Palo Alto, CA 94304; (408) 996-9800. **CIRCLE 165**

Converting Files

Transit converts any Apple II data file into a file for High Technology's data-management package, Information Master.

Once a file has been transferred to Information Master, it can be sorted, searched, calculated and printed in custom-designed reports. The file can also be subdivided, appended and manipulated.

The program requires a 48k Apple with one disk drive, and costs $50.

For more information: High Technology Software Products, 8001 N. Classen, P.O. Box 14665, Oklahoma City, OK 73113; (405) 840-9900. **CIRCLE 166**

Timing Program

RPM measures the rotational speed and variation of disk drives for the TRS-80 Model I or III. Rotational speed errors often cause problems, and variations in speed can cause intermittent, hard-to-detect errors. RPM shows the user the speed, percent error, and history of speed variation on any disk drive connected to a TRS-80.

Readouts are shown in numbers, percents, words and graphs. RPM shows all speed ranges, and can recover from errors without a system reset.

RPM is available on diskette for $24.95.

For more information: PROSOFT, Box 839, North Hollywood, CA 91603; (213) 764-3131. **CIRCLE 167**

Tutor by Computer

Brain Box personal computer courseware provides step-by-step sequential programs on a variety of subjects, and includes 200 programs on 30 titles. Each diskette or cassette teaches four or more concepts. The personal computer records and scores

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80 track TEAC drives **$429.95**
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4 drive cable ..... **$ 39.95**
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NEWDOS 80 PATCH Patches **NEWDOS 80** to work with single or double density and the doubler..... **$ 59.95**
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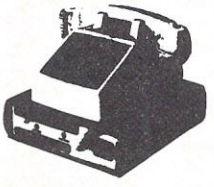
MODEMS AND TELE-COMMUNICATIONS



LYNX Telecommunication system for the TRS-80 and PMC-80 .....**$279.95**
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COMPLETE SYSTEMS:

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INCLUDES: 32K memory, S-100 bus, RS-232 interface, Parallel printer driver, Disk controller Fully compatable with **TRSDOS, NEWDOS, VTOS,** and all other **TRS-80 Mod I disk software!**

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the responses, tallies the test, reports and comments on the grade, and may suggest which lessons should be restudied.

The programs are for Apple and PET personal computers. Prices range from $50–80.

For more information: Brain Box, 601 West 26 St., New York, NY 10001; (212) 989-3573. **CIRCLE 168**

Report Cards

Grade Reporting System enables school administrators to produce report cards and auxiliary printouts using any personal computer operating under CP/M and Microsoft BASIC-80. The package serves schools of up to 2000 students and produces report cards and 15 other reports within one day.

The report card lists parent name and address, student, course, teacher names, numerical or letter grades, up to 99 variable comments for each course, cumulative credit hours, and attendance data. Other summary reports include honor rolls, rank-in-class listings, alpha-cumulative GPA listings, summary attendance lists, class lists, failure and incomplete list, frequency distribution of grades, and mailing lists.

The price is $2000.

For more information: Applied Educational Systems, RFD #2, Box 213, Dunbarton, NH 03301; (603) 774-6151. **CIRCLE 169**

Attendance Reports

The Attendance Reporting System provides student absenteeism and tardiness reports for elementary and secondary schools. It can accommodate any size school and provides eight user-defined absence categories to meet particular internal- and external-reporting requirements.

The system is for an Apple II with 64k, two 16-sector 5¼-inch disk drives and a printer. The price is $550.

For more information: Educational Services Management, Dept. M, P.O. Box 12599, Research Triangle Park, NC 27709; (919) 781-1500. **CIRCLE 170**

SYSTEM

Compiler BASIC

The RSBASIC development system for the TRS-80 Model I and III is a business-oriented BASIC language used as a development package for new software. It allows the user to

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Here's the price breakthrough you've been waiting for on Winchester disk systems. It's our new 5¼-inch 5-million byte Winchester that adds cost effective mass storage to over 15 of the most popular microcomputers. Now everyone can enjoy the improved reliability, increased storage capacity, and faster speed of sealed-environment Winchester technology.

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SOFTWARE UPDATE

write a program in BASIC and provides accuracy and speed.

Features of the system include: sequential, random and single-key ISAM file access for organization and retrieval of business data; direct calls to machine-language programs; program-chaining capabilities with common variable storage; numerical accuracy to 14 significant digits for real numbers; step and trace debugging; printer and disk utilities; strings, arithmetic, trigonometric and bit operations; conversions between data types; and full editing capabilities.

RSBASIC requires a 48k dual-disk TRS-80 Model I or III and costs $149.

For more information: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3272.
CIRCLE 171

Operating System

MP/M II, an operating system for multi-user systems, features record and file locking as well as optional "password protection" for data security.

Minimum requirements for MP/M II are: an 8080, 8085 or Z80 processor, 48k RAM, a clock timer interrupt, one disk subsystem and a console. It can support up to 16 consoles, 16 printers and 16 disk drives with up to 512 megabytes of storage each.

MP/M II's utilities include: RMAC, a relocatable macro-assembler; LINK-80, a linker with overlay facilities; and LIB, a program library management utility.

The record and file-locking features are designed to prevent inaccuracies in data which can result when two or more users are updating the same files at the same time.

MP/M II is distributed on a standard format IBM single-density 8-inch floppy disk, and costs $450.

For more information: Digital Research, P.O. Box 579, Pacific Grove, CA 93950; (408) 649-3896.
CIRCLE 172

GAMES

Action-Adventure

Castle Wolfenstein is an action-adventure game that bridges the gap between arcade games and adventure/fantasy games.

The game's scenario places the player in the role of an Allied soldier during World War II. His mission is to find the Nazi war plans hidden in the castle and escape without being captured.

Castle Wolfenstein requires an Apple II or II Plus with 48k and a disk drive running 3.2 or 3.3 DOS.

The price is $29.95.

For more information: Muse Software, 330 N. Charles St., Baltimore, MD 21201; (301) 659-7212.
CIRCLE 173

Moving Graphics

Double Breakout is a fast computer ball game featuring continuous moving graphics for the 1k Sinclair ZX80.

The game challenges the player to hit a ball with a movable bat. The ball chips away at a brick wall, and to win, the player must break through two walls of bricks.

The game is available on cassette for $14.95.

For more information: Softsync, P.O. Box 480, Murray Hill Station, New York, NY 10156; (212) 684-2788. **CIRCLE 174**

Move Up to Tarbell

The Serious Business Machine

Do you have a small computer system that operates with mini-floppies and has limited storage capacity? Then it's time to move up to the Tarbell Empire Series System. Tarbell starts where small systems leave off, providing storage from 1 to 20 megabytes. This means Tarbell is capable of growing right along with your business. (It also makes sense to start with Tarbell if you're a first-time computer buyer.)

Tarbell is the serious general purpose business machine, backed by years of experience with disk systems. It gives you word processing, inventory control with bill of materials, mailing lists — all in addition to accounting applications: general ledger, payables, receivables, payroll with cost accounting and order entry. Whatever your need may be, Tarbell can provide the working software that gets the job done.

With the Tarbell System you get a Z80 4 Mhz CPU with memory management, timer and full interrupt capability, 2 RS-232 serial ports with handshaking, 64 K bytes of random-access memory, double density floppy disk interface, 2 double density floppy disk drives, cabinet, power supply, and cables.

The software includes: CP/M™ 2.2 disk operating system, Tarbell Disk BASIC, Tarbell Database System, and all manuals and documentation.

Tarbell also offers the MP/M™ Multi-User Operating System and 4 additional RS-232 serial ports.

The Tarbell Empire Series is delivered assembled, tested, and with a FULL six-month warranty on parts and labor.

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CIRCLE 78

NEW LITERATURE

Educational Guide

The First Annual Compendium of Common and Uncommon Computer Lore is a resource guide for educational computing. It provides educators with resource lists for hardware and software vendors, publishers, degree programs, associations, user groups, books, resource centers and consultants serving the educational-computing field.

The guide also features articles on hardware, software, computer language and profiles of innovative educational-computing programs throughout the country.

The price is $5.

For more information: Compendium, *Classroom Computer News,* P.O. Box 266, Cambridge, MA 02130; (617) 923-8595. **CIRCLE 175**

VisiCalc Periodical

SATN is a bi-monthly periodical designed to help users of VisiCalc apply the program more effectively.

Each issue highlights functions of the program, problem-solving techniques, hypothetical problems, solutions and applications. Tutorials are also included for all personal computers that run the program.

A six issue subscription to *SATN* is $30.

For more information: *SATN* Subscriptions, P.O. Box 815, Quincy, MA 02169; (800) 257-7850, operator 737. In NJ; (800) 322-8650.
CIRCLE 176

Copyright Software

The Copyright Kit - How to Copyright Your Computer Software, is a 60-page booklet that takes the reader step-by-step through the copyright procedure.

A brief history of the copyright law, a comparison of patents and trade secrets to copyrights, and remedies for copyright infringement are incorporated into the booklet. Samples of forms, as well as instructions are included.

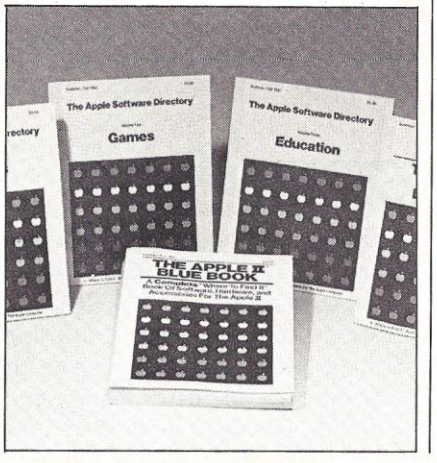
The Copyright Kit costs $11.95.

For more information: B.T. Enterprises, 171 Hawkins Rd., Centreach, NY 11720. **CIRCLE 177**

Apple Directories

The Apple Resource Directory and *The Apple II Blue Book* join the business, games and education software directories currently on the market providing information for Apple computer users.

The directory is an Apple users guide to publications, boards, peripherals, accessories, users groups, clubs, time-sharing systems and newsletters.



The price is $5.95.

The blue book is a compilation of the information found in the other software directories.

The price is $19.95.

The directories can be purchased individually from your Apple dealer.

For more information: WIDL Video, 5245 W. Diversey, Chicago, IL 60639; (312) 622-9606.

CIRCLE 178

Computer Graphics

Choosing the Right Chart: A Comprehensive Guide for Computer Graphics Users is a 40-page hand-

NEW LITERATURE

book to aid in the selection of charts, optimal style and design of computer-graphics production.

All graphics are produced by computer-graphics software systems which translate computer data into graphic art-quality charts, graphs, maps and 3-D visual presentations.

The handbook costs $8.50.

For more information: ISSCO, 4186 Sorrento Valley Blvd., San Diego, CA 92121; (714) 452-0170.

CIRCLE 179

Educational Booklet

The proceedings of the 1981 conference at the College of Education at Arizona State University are now available in a 340-page booklet.

Topics include techniques for teaching BASIC programming on an elementary level, using computers with blind and deaf children and for high school physics.

The booklet costs $10.

For more information: Dr. Gary Bitter, Arizona State University, Payne B203, Tempe, AZ 85287.

CIRCLE 180

Educational Journal

Classroom Computer News provides educators with information to help them make effective use of computers in their schools.

Each issue informs the reader of industry trends, application ideas, programs, book reviews, hardware, software and issues facing computer-using educators.

An annual subscription is $12.

For more information: *Classroom Computer News*, Intentional Educations, Inc., P.O. Box 266, Cambridge, MA 02138; (617) 923-8595.

CIRCLE 181

Balancing the books

continued from page 106

This program runs on an Apple II.

```
LIST

1  REM  **** VERSION C ****** 7/12/80 ***
10  REM  *********************************
20  REM  *         BALANCE SHEET          *
30  REM  *       COPYRIGHT 1980 BY        *
40  REM  *      W. B. GOLDSMITH, JR       *
50  REM  *       LAKEWOOD, CA 90712       *
60  REM  *********************************
70  DIM A(22),L(6),S(7)
80  HOME
90  INPUT "BUSINESS NAME ";N$,M$
100  INPUT "STATEMENT DATE ";D$
110  PRINT : PRINT "ASSETS": PRINT
120  PRINT : INPUT "CASH ON HAND AND IN BANK ";A(1)
130  INPUT "ACCOUNTS RECEIVABLE ";A(2)
140  IF A(2) = 0 THEN 160
150  INPUT "ALLOWANCE FOR BAD DEBTS ";A(3)
160  INPUT "INVENTORIES ";A(4)
170  PRINT "GOVERMENT OBLIGATIONS"
180  INPUT "(A) U.S. AND INSTRUMENTALITIES ";A(5)
190  INPUT "(B) STATE AND LOCAL ";A(6)
200  PRINT "LIST OTHER CURRENT ASSETS"
210  PRINT "ITEM <COMMA> AMOUNT"
220  FOR X = 1 TO 10
230  INPUT A$(X),B(X)
240 A(7) = A(7) + B(X)
250  IF B(X) = 0 THEN X = 10
260  NEXT X
310  INPUT "LOANS TO OFFICERS/STOCKHOLDERS ";A(8)
320  INPUT "MORTGAGE & REAL ESTATE LOANS ";A(9)
330  INPUT "OTHER INVESTMENTS ";A(10)
340  INPUT "BUILDINGS & OTHER FIXED ASSETS ";A(11)
350  IF A(11) = 0 THEN 370
360  INPUT "ACCUMULATED DEPRECIATION ";A(12)
370  INPUT "DEPLETABLE ASSETS ";A(13)
380  IF A(13) = 0 THEN 400
390  INPUT "ACCUMULATED DEPLETION ";A(14)
400  INPUT "LAND ";A(15)
410  INPUT "FURNITURE & FIXTURES ";A(16)
420  IF A(16) = 0 THEN 440
430  INPUT "ACCUMULATED DEPRECIATION ";A(17)
440  INPUT "TRANSPORTION EQUIPMENT ";A(18)
450  IF A(18) = 0 THEN 470
460  INPUT "ACCUMULATED DEPRECIATION ";A(19)
470  INPUT "INTANGIABLE ASSETS ";A(20)
480  IF A(20) = 0 THEN 500
490  INPUT "ACCUMULATED AMORIZATION ";A(21)
500  PRINT "LIST OTHER ASSETS"
510  PRINT "ITEM <COMMA> AMOUNT"
520  FOR X = 1 TO 10
530  INPUT C$(X),D(X)
540  IF D(X) = 0 THEN X = 10
550 A(22) = A(22) + D(X)
560  NEXT X
570  PRINT : PRINT "LIABILITIES & CAPITAL": PRINT
580  PRINT "LIABILITIES": PRINT
590  INPUT "ACCOUNTS PAYABLE ";L(1)
600  INPUT "MORTGAGE, NOTES, BONDS PAYABLE IN LESS
     THAN ONE YEAR ";L(2)
610  PRINT "LIST OTHER CURRENT LIABILITIES"
620  PRINT "ITEM <COMMA> AMOUNT"
630  FOR X = 1 TO 10
640  INPUT L$(X),E(X)
650  IF E(X) = 0 THEN X = 10
660 L(3) = L(3) + E(X)
670  NEXT X
680  INPUT "LOANS FROM STOCKHOLDERS ";L(4)
690  INPUT "MORTGAGES, NOTES, BONDS PAYABLE IN ONE
     YEAR OR MORE ";L(5)
700  PRINT "LIST OTHER LIABILITIES"
710  PRINT "ITEM <COMMA> AMOUNT"
720  FOR X = 1 TO 10
730  INPUT M$(X),F(X)
740  IF F(X) = 0 THEN X = 10
750 L(6) = L(6) + F(X)
760  NEXT X
770  INPUT "CORPORATION ";Z$
780  IF  LEFT$ (Z$,1) = "N" THEN 860
790  PRINT : PRINT "CAPITAL": PRINT
800  PRINT "CAPITAL STOCK"
810  INPUT "(A) PREFERRED STOCK ";S(1)
820  INPUT "(B) COMMON STOCK ";S(2)
830  INPUT "PAID IN OR CAPITAL SURPLUS ";S(4)
840  INPUT "APPROPRIATED RETAINED EARNINGS ";S(5)
850  INPUT "COST OF TREASURY STOCK ";S(7)
860  PRINT "TYPE THE NUMBER OF THE OUTPUT TERMINAL  YOU WISH ";
870  INPUT "TO USE FOR THIS STATEMENT ";Z
880  INPUT "PRESS <RETURN> TO PRINT ";Y$
890  PR# Z
900  PRINT : PRINT
910  PRINT  TAB( 25);"(ATTACHMENT TO TAX RETURN)"
920  PRINT : PRINT
930  PRINT  TAB( 32);"BALANCE SHEET"
940  PRINT
950  PRINT  TAB(  INT ((76 -  LEN (N$)) / 2));N$
960  PRINT  TAB(  INT ((76 -  LEN (M$)) / 2));M$
970  PRINT
980  PRINT  TAB(  INT ((73 -  LEN (D$)) / 2));"AT ";D$
990  PRINT : PRINT : PRINT
1000  PRINT  TAB( 35);"ASSETS"
1010  PRINT "CASH"; TAB( 74 -  LEN ( STR$ (A(1))));"$ ";A(1)
1020  IF A(2) = 0 THEN 1070
1030  PRINT "TRADE NOTES/ ACCTS RECEIVABLE"; TAB( 48 -  LEN
     ( STR$ (A(2))) );"$ ";
1035  PRINT A(2)
1040  PRINT "LESS BAD DEBT ALLOWANCE"; TAB( 50 -  LEN ( STR$
     (A(3))));A(3) ;
1050 D1 = A(2) - A(3)
1060  PRINT  TAB( 76 -  LEN ( STR$ (D)));D1
1070  IF A(4) = 0 THEN 1090
1075  PRINT
1080  PRINT "INVENTORIES"; TAB( 76 -  LEN ( STR$ (A(4))));A(4)
1090  IF (A(5) + A(6)) = 0 THEN 1130
1100  PRINT "GOVERMENT OBLIGATIONS"
1110  PRINT  TAB( 5);"U.S.GOVERMENT"; TAB( 76 -  LEN ( STR$
     (A(5))));A(5)
1120  PRINT  TAB( 5);"STATE AND LOCAL"; TAB( 76 -  LEN ( STR$
     (A(6))));A(6)
1130  IF A(7) = 0 THEN 1260
1140  PRINT "OTHER CURRENT ASSETS"
1150  PRINT "OTHER CURRENT ASSETS"
1160  FOR X = 1 TO 10
1170  IF B(X) = 0 THEN 1190
1180  PRINT  TAB( 5);A$(X); TAB( 50 -  LEN ( STR$ (B(X))));B(X)
1190  NEXT X
1200  PRINT  TAB( 76 -  LEN ( STR$ (A(7))));A(7)
1260  IF A(8) = 0 THEN 1280
1270  PRINT "LOANS TO STOCKHOLDERS/OFFICERS"; TAB( 76 -  LEN
     ( STR$ (A(8))));
1275  PRINT A(8)
1280  IF A(9) = 0 THEN 1300
1290  PRINT "MORTGAGE & REAL ESTATE LOANS"; TAB( 76 -  LEN ( STR$
     (A(9))) ;A(9)
1300  IF A(10) = 0 THEN 1320
1310 PRINT "OTHER INVESTMENTS"; TAB( 76 -  LEN ( STR$ (A(10))));A(10)
1320  IF A(11) = 0 THEN 1360
1330  PRINT "BUILDINGS"; TAB( 48 -  LEN ( STR$ (A(11))));"$
     ";A(11)
1340  PRINT "LESS ACCUM DEPRECIATION"; TAB( 50 -  LEN ( STR$
     (A(12))));A(1 2);
1350  PRINT  TAB( 76 -  LEN ( STR$ (A(11) - A(12))));A(11) - A(12)
1360  IF A(13) = 0 THEN 1400
1370  PRINT "DEPLETABLE ASSETS"; TAB( 48 -  LEN ( STR$ (A(13)
     )));"$ ";A(13 )
1380  PRINT "LESS DEPLETION"; TAB( 50 -  LEN ( STR$ (A(14))));A(14)
1390  PRINT  TAB( 76 -  LEN ( STR$ (A(13) - A(14))));A(13) - A(14))
1400  IF A(15) = 0 THEN 1420
1410  PRINT "LAND"; TAB( 76 -  LEN ( STR$ (A(15))));A(15)
1420  IF A(16) = 0 THEN 1460
1425  PRINT
1430  PRINT "FURNATURE & FIXTURES"; TAB( 48 -  LEN ( STR$ (A(16))))
     ;"$ ";A (16)
1440  PRINT "LESS DEPRECIATION"; TAB( 50 -  LEN ( STR$ (A(17))))
     ;A(17);
1450  PRINT  TAB( 76 -  LEN ( STR$ (A(16) - A(17))));A(16) - A(17))
1460  IF A(18) = 0 THEN 1500
1470  PRINT "TRANSPORTATION EQPT"; TAB( 48 -  LEN ( STR$ (A(18)
     )));"$ ";A(18)
1480  PRINT "LESS DEPRECIATION"; TAB( 50 -  LEN ( STR$ (A(19)
     )));A(19);
1490  PRINT  TAB( 76 -  LEN ( STR$ (A(18) - A(19))));A(18) - A(19))
1500  IF A(20) = 0 THEN 1550
1510  PRINT "INTANGABLE ASSETS"; TAB( 48 -  LEN ( STR$ (A(20)
     )));"$ ";A(20)
1520  PRINT "LESS AMORTIZATION"; TAB( 50 -  LEN ( STR$ (A(21)
     )));A(21);
1530  PRINT  TAB( 76 - LEN ( STR$ (A(20) - A(21))));(A(20) - A(21))
1550  IF A(22) = 0 THEN 1630
1560  PRINT "OTHER ASSETS"
1570  FOR X = 1 TO 10
1580  IF D(X) = 0 THEN 1600
1590  PRINT  TAB( 5);C$(X); TAB( 50 -  LEN ( STR$ (D(X))));D(X)
1600  NEXT X
1610  PRINT  TAB( 76 -  LEN ( STR$ (A(22))));A(22)
1630 A = A(1) + A(2) - A(3) + A(4) + A(5) + A(6) + A(7) + A(8)
     + A(9) + A(10)
1640 A = A + A(11) - A(12) + A(13) - A(14) + A(15) + A(16) - A(17)
```

PROGRAM LISTINGS

```
1650 A = A + A(18) - A(19) + A(20) - A(21) + A(22)
1660  PRINT  TAB( 66);"----------"
1670  PRINT "TOTAL ASSETS"; TAB( 74 -  LEN ( STR$ (A)));"$ ";A
1680  PRINT  TAB( 66);"=========="
1690  PRINT : PRINT  TAB( 32);"LIABILITIES": PRINT
1700  IF L(1) = 0 THEN 1720
1710  PRINT "ACCOUNTS PAYABLE"; TAB( 74 -  LEN ( STR$ (L(1))));"$ ";L(1)
1720  IF L(2) = 0 THEN 1750
1730  PRINT "MORTGAGES, NOTES, BONDS PAYABLE IN LESS THAN ONE YEAR"
1740  PRINT  TAB( 76 -  LEN ( STR$ (L(2))));L(2)
1750  IF L(3) = 0 THEN 1840
1760  PRINT "OTHER CURRENT LIABILITIES"
1770  FOR X = 1 TO 10
1780  IF E(X) = 0 THEN 1800
1790  PRINT  TAB( 5);L$(X); TAB( 50 -  LEN ( STR$ (E(X))));E(X)
1800  NEXT X
1830  PRINT  TAB( 76 -  LEN ( STR$ (L(3))));L(3)
1840  IF L(4) = 0 THEN 1860
1850  PRINT "LOANS FROM STOCKHOLDERS"; TAB( 76 -  LEN ( STR$ (L(4))));L(4)

1860  IF L(5) = 0 THEN 1890
1870  PRINT "MORTGAGES, NOTES, BONDS PAYABLE IN ONE YEAR OR MORE"
1880  PRINT  TAB( 76 -  LEN ( STR$ (L(5))));L(5)
1890  REM
1900  IF L(6) = 0 THEN 1980
1910  PRINT "OTHER LIABILITIES"
1920  FOR X = 1 TO 10
1930  IF F(X) = 0 THEN 1950
1940  PRINT  TAB( 5);M$(X); TAB( 50 -  LEN ( STR$ (F(X))));F(X)
1950  NEXT X
1960  PRINT  TAB( 76 -  LEN ( STR$ (L(6))));L(6)
1980  PRINT  TAB( 66);"----------"
1990 L = L(1) + L(2) + L(3) + L(4) + L(5) + L(6)
2000  PRINT "TOTAL LIABILITIES"; TAB( 74 -  LEN ( STR$ (L)));"$ ";L
2010  IF  LEFT$ (Z$,1) = "Y" THEN 2190
2020 C = A - L
2030  PRINT
2040  PRINT "CAPITAL/OWNERSHIP"; TAB( 76 -  LEN ( STR$ (C)));C
2050  PRINT
2060  PRINT  TAB( 66);"----------"
2070  PRINT "TOTAL LIABILITIES AND CAPITAL";
2080  PRINT  TAB( 74 -  LEN ( STR$ (C + L)));"$ ";(C + L)
2090  PRINT  TAB( 66);"=========="
2100  PRINT : PRINT : PRINT : PRINT
2130  PRINT  CHR$ (12): REM  FORM FEED TO PRINTER
2150  PR# 0
2160  INPUT "ANOTHER COPY ";Y$
2170  IF  LEFT$ (Y$,1) = "Y" THEN 860
2180  END
2190  PRINT : PRINT  TAB( 35);"CAPITAL": PRINT
2200  PRINT "CAPITAL STOCK"
2210 S(3) = S(1) + S(2)
2220  PRINT  TAB( 5);"PREFERRED"; TAB( 48 -  LEN ( STR$ (S(1))));"$ ";S(1
     )
2230  PRINT  TAB( 5);"COMMON"; TAB( 50 -  LEN ( STR$ (S(2))));S(2);
2240  PRINT  TAB( 74 -  LEN ( STR$ (S(3))));"$ ";S(3)
2250  IF S(4) <  > 0 THEN 2270
2260 S(4) = A - L - S(3) - S(7)
2270  PRINT "PAID IN OR CAPITAL SURPLUS"; TAB( 76 -  LEN ( STR$ (S(4))));S
     (4)
2280  IF S(5) = 0 THEN 2300
2290  PRINT "APPROPRIATE RETAINED EARNINGS"; TAB( 76 -  LEN ( STR$ (S(5)))
     );S(5)
2300 C = S(3) + S(4) + S(5) + S(7)
2310 S(6) = A - L - C
2320  PRINT "UNAPPROPRIATED RETAINED EARNINGS";
2325  PRINT  TAB( 76 -  LEN ( STR$ (S(6))));S(6)
2330  IF S(7) = 0 THEN 2350
2340  PRINT "COST OF TREASURY STOCK"; TAB( 76 -  LEN ( STR$ (S(7))));S(7)
2350 C = S(3) + S(4) + S(5) + S(6) + S(7)
2360  PRINT  TAB( 66);"----------"
2370  PRINT "TOTAL CAPITAL"; TAB( 74 -  LEN ( STR$ (C)));"$ ";C
2380  GOTO 2060

]
```

Formatting inputs

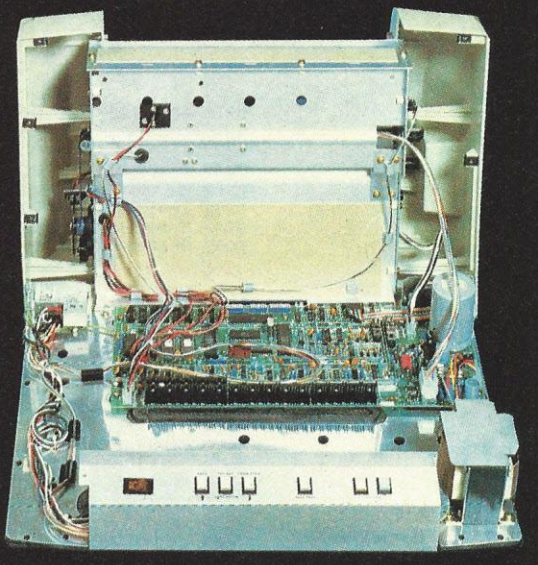
This program is written for a TRS-80 Model I.

continued from page 70

Figure 4. Typical display for coded input entries

```
                . . . EXPENSE CODES . . .
 1 TRUCK 1       10 PKG MTL      19 BRN WM       28 SQUID
 2 TRUCK 2       11 LABOR        20 MEAL WM      29 CLAM-SW
 3 TRUCK 3       12 POWER        21 CRICKET      30 MUSSEL
 4 TRUCK 4       13 PHONE        22 CRAY FISH    31 SHRP-FW
 5 MEALS         14 TAXES        23 WTR DOG      32 SHRP-SW
 6 PERSONAL      15 WELL EXP.    24 MUD PUP      33 BOTTLE BAIT
 7 OFF SPLY      16 INSURANCE    25 CLM-FW       34 TACKLE
 8 HARDWARE      17 CRAWLERS     26 MACKERAL     C=CASH / CK. #
 9 LID/CUPS      18 RED WM       27 ANCHOVY      99 - END
 ------------------------------------------------------------
  5  MONTH ? 2   EXP. CODE? 5    AMOUNT? 6.75    CASH/CHECK? C
```

Say Ahh...



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```
TYPE/ENTER 1 TO CORRECT, ELSE 0 )? 0_
```

Listing 1. Typical formatted input routine

```
1 '              FORMATTED ADDRESS FILE INPUT
2 '
10 CLEAR 1000: DIMA$(100), C$(100), N$(100), S$(100)
20 '
30 '     LINES 20 THRU 90 RESERVED FOR MENU
40 '
100 CLS: INPUT "TYPE/ENTER RECORD STARTING NUMBER =) ";R
110 CLS: PRINT "TYPE/ENTER INFORMATION AT '?' PROMPT
    (USE NO COMMAS), OR WORD 'END' AT NAME PROMPT
    TO EXIT INPUT CYCLE."
115 PRINT STRING$(63,45)
120 PRINT "RCD/NAME"; TAB(24)"ADDRESS"; TAB(40)"CITY";
    TAB(54) "STATE-ZIP"
130 PRINT STRING$(63,45)
140 '            ESTABLISH PRINT@ AND LINE COUNT VARIABLES
150 G=320: L=0: '        G = PRINT LOCATION, L = LINE
    COUNTER
160 PRINT @ G, R;: PRINT@ G+2,;: INPUT N$(R)
170 IF N$(R)="END" THEN 380 ELSE 180
180 G=G+22: PRINT@G,;: INPUT A$(R): G=G+16: PRINT@G,;:
    INPUT C$(R):
    G=G+16: PRINT@G,;: INPUT S$(R): G=G+10
190 R=R+1: L=L+1:'       INCREMENT COUNTERS
200 IF L<5 THEN 160 ELSE 300
210 GOTO 300
299 '            CORRECTION ROUTINE
300 PRINT@ 832, "TYPE/ENTER 1 TO CORRECT AN ENTRY,
    ELSE 0 =) ";: INPUT X
310 IF X = 1 THEN 320 ELSE 370
320 PRINT@ 832, CHR$(31);:'          ERASE CORRECTION LINE
330 PRINT@ 832, "TYPE ENTER LINE NUMBER TO BE CHANGED =)
    ";: INPUT Y
340 PRINT@ 832, CHR$(31);:'          ERASE STATEMENT
350 PRINT@832, "TYPE/ENTER NAME , ADDRESS , CITY ,
    STATE-ZIP";: INPUT N$(Y), A$(Y), C$(Y), S$(Y)
360 PRINT@832, CHR$(31);: GOTO 300
370 G=320: L=0: PRINT@ G, CHR$(31): GOTO 160
380 GOTO 50:'                        RETURN TO MENU
```

Listing 2. Tabular page format listing

```
99 '            --- DATA INPUT
100 CLS:GOSUB900:GOSUB2000
105 G=256:Q=0
110 PRINT@G,E;S$(E):G=G+10:IFS$(E)="END" THEN 50 ELSE 112
112 PRINT@G,;:GOSUB9200: A(E)=VAL(ZY$):G=G+5
114 PRINT@G,;:GOSUB9200:B(E)=VAL(ZY$):G=G+5
115 PRINT@G,;:GOSUB9200:C(E)=VAL(ZY$):G=G+5
116 PRINT@G,;:GOSUB9200:D(E)=VAL(ZY$):G=G+5:
    PRINT@G,;:GOSUB9200:E(E)=VAL(ZY$):G=G+5:
    PRINT@G,;:GOSUB9200:F(E)=VAL(ZY$):G=G+5
117 PRINT@G,;:GOSUB9200:G(E)=VAL(ZY$):G=G+5:
    PRINT@G,;:GOSUB9200:H(E)=VAL(ZY$):G=G+5
118 PRINT@G,;:GOSUB9200:I(E)=VAL(ZY$):G=G+5:
    PRINT@G,;:GOSUB9200:J(E)=VAL(ZY$):G=G+5:
    PRINT@G,;:GOSUB9200:K(E)=VAL(ZY$):G=G-3
125 GOSUB2500
130 Q=Q+1:E=E+1:IFQ<8THEN135ELSE4000
135 GOSUB2000:G=G+7:GOTO110
140 PRINT@448,CHR$(31);:INPUT"TYPE/ENTER LINE # =) ";E:
    GOTO 105
```

```
1999 '      -----NAME ENTRY PROMPT
2000 PRINT@L,"INPUT STORE NAME (KEEP TO 5 LETTERS":PRINT"
==) STO
RE NAME ==) ";:GOSUB9100:S$(E)=Y$:PRINT@L,CHR$(31);:RETURN

2499 '      -----ENTRY CORRECTION ROUTINE
2500 PRINT@L,"TYPE 1 TO CORRECT AN ENTRY, ELSE '0' =) ";:
GOSUB90 00:X=VAL(Z$)
2510 IFX=1 THEN 2520 ELSE 2515
2515 PRINT@L,CHR$(31);:RETURN
2520 PRINT@L,CHR$(31);:G=G-57:GOTO110
9199 '      -----DOUBLE DIGIT ENTRY W/ FLASHING CURSOR
9200 ZA$="":ZZ$=""
9210 ZZ$=INKEY$:PRINTCHR$(15);CHR$(132);:FORW=1TO30:NEXT:
PRINTCH  R$(8);:IFZZ$=""THEN9210ELSE9225
9225 Z1$=ZZ$: PRINTZ1$;
9230 ZA$=INKEY$:PRINTCHR$(15);CHR$(132);:FORW=1TO30:NEXT:
PRINTCH  R$(8);:IFZA$=""THEN 9230 ELSE 9235
9235 Z2$=ZA$: PRINTZ2$
9240 ZY$=Z1$+Z2$:RETURN
9250 RETURN
```

Listing 3. Typical non-scrolling input routines

```
900 CLS:PRINT"TYPE YOUR NAME ) ";:GOSUB 9100: WW$=Y$
910 PRINT@320,"YOU TYPED --) ";WW$
920 PRINT@448,"TYPE 1 TO REPEAT, ELSE '0' ) ";:GOSUB 9000
930 IFVAL(Z$)= 1 THEN 900 ELSE 940
940 PRINT@576,"THE END":PRINT:END
8999 '-----BLINKING CURSOR
9000 Z$="":Z=0
9010 PRINTCHR$(15);CHR$(140);:FORW=1TO20:NEXT:PRINTCHR$(8);
9020 Z$=INKEY$:IFZ$=""THENPRINT" ";:FORW=1TO20:NEXT:
PRINTCHR$(8)  ;:GOTO9010ELSEIFZ$=CHR$(13)THEN9030
9030 RETURN
9090 '----SOLID CURSOR W/ TRIAL EXERCISE AT 900
9100 Y$="":PRINT" ";CHR$(138);
9110 IFYY$=CHR$(8)THENY$=LEFT$(Y$,LEN(Y$)-2)
9120 YY$=INKEY$:IFYY$=""THEN9120ELSEIFYY$=CHR$(13)
THEN9150ELSEIF YY$=CHR$(8)THEN PRINTCHR$(8);CHR$(138);
9130 PRINTCHR$(8);YY$;CHR$(138);:Y$=Y$+YY$:GOTO9110
9150 IFY$=""ANDYY$=CHR$(13)THEN Y$=CHR$(13)
9160 RETURN
```

Listing 4.

```
1 '       --- NON-SCROLLING INPUT WITH CHARACTER LIMITER ---
2 '
3 '      --- LINES 140 TO 200 ARE TYPICAL PROGRAM LINES
         PRESENTED FOR EXAMPLE AND TRIAL PURPOSES.
4 '
140 CLS
150 PRINT "STATE          : ";:'   --- PRINT LABEL
152 Y = 2:'                        --- SET CHARACTER LIMITER Y
154 GOSUB 9000:'                   --- GOSUB FOR KEYBOARD INPUT
156 S$(R) = B$:'                   --- SWAP STRINGS FOR STORAGE
158 PRINT:'                        --- INSERT LINE FEED
159 '                              --- REPEAT FOR NEXT LABEL
160 PRINT "ZIP CODE     : ";:'   --- DISPLAY NEXT LABEL
162 Y = 5:'                        --- SET ZIP CODE LIMITER
164 GOSUB 9000:'                   --- GOSUB FOR KEYBOARD INPUT
168 Z$(R) = B$:'                   --- SWAP STRINGS FOR STORAGE
170 PRINT: PRINT TAB(5)S$(R)"  ";Z$(R):'
              --- LINE 170 DISPLAY IS FOR TRIAL ONLY ---
180 END
182 '
8090 '          ----- INKEY$ (KEYBOARD) INPUT -----
8095 '
9000 A$ = "": B$ = "": X = 0:'   --- SET VARIABLES TO ZERO
9010 A$ = INKEY$: IF A$ = "" THEN 9010 ELSE 9020
9020 B$ = B$ + A$:'                --- STORE INPUT IN B$ STRING
9022 PRINT A$;'                    --- DISPLAY KEYBOARD INPUT
9034 X = X + 1:'                   --- INCREMENT LIMIT COUNTER X
9036 '                             --- TEST FOR LIMIT VALUE NEXT
9038 IF Y = X THEN RETURN ELSE 9010
9040 '          --- LOOP BACK FOR NEXT INPUT IF TEST FAILS
```

```
1 '              SAMPLE FORMATTED INPUT ROUTINES
2 '                          BY
3 '                     JOE W. ROCKE
4 '                      JUNE 1981
5 '
6 '      DEMONSTRATION FEATURES INCLUDE FORMATTED INPUT,
         BLINKING CURSOR INPUT, AND NON-SCROLLING INPUT
         ROUTINES.
7 '
10 CLEAR 1000: DIMA$(50), C$(50), N$(50), S$(50)
20 DEFINT G, L, R, X: ST$=STRING$(63,45): G1 = 896
30 CLS: PRINTTAB(15)". . . FORMATTED INPUT ROUTINES . . .
   ":PRINT
40 PRINT"THIS PROGRAM INCLUDES 2 EXAMPLES OF FORMATTED INPUT"
50 PRINT"PER THE FOLLOWING MENU:": PRINT
60 PRINT"1 = NAME/ADDRESS FILE"; TAB(35)"2 = NON-SCROLL INPUT"
70 PRINT: PRINT"THE =ENTER= KEY NEED NOT BE USED AT BLINKING
   CURSOR.": PRINT"ENTER A NUMBER, OR PRESS SPACEBAR
   FOR DEFAULT ENTRY.": PRINT
```

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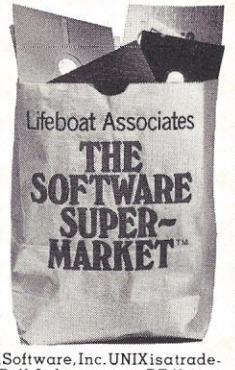

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	— Actual —			Growth		Total	—Projected—		
	1978	1979	1980	Rate	Average	(000's)	1981	1982 *	1985
Item A	**42,323**	**51,891**	**65,123**	24.04	53,112	159.34	80,782	100,206	191,262
Item B	**45,671**	**46,128**	**49,088**	3.67	46,962	140.89	50,891	52,761	58,791
Total	87,994	98,019	114,211	13.93	100,075	300.22	131,673	152,966	250,053
% Item	48.10	52.94	57.02	8.88	52.69	158.1	61.35	65.51	76.49
% Item	51.90	47.06	42.98	-9.00	47.31	141.9	38.65	34.49	23.51
Total	100.00	100.00	100.00	—	100.00	300.0	100.00	100.00	100.00

*Two intervening years not shown.

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PROGRAM LISTINGS

```
80 PRINT: PRINT"TYPE SELECTION NUMBER =) ";
90 Q=1: GOSUB 9000: X=VAL(Y$):'          GET BLINKING CURSOR
95 '              Q = LIMIT VALUE FOR CURSOR INPUT
                  X = INTEGER VALUE OF Y$
100 ON X GOTO 200, 10000
200 CLS: PRINTTAB(15)". . . NAME/ADDRESS FILE EXAMPLE . . .
    ":PRINT
210 PRINT"TYPE FILE RECORD STARTING NUMBER (1-50) =) ";:
    Q=2: GOSUB 9000: R=VAL(Y$): PRINT
220 PRINT: PRINT"YOUR FILE RECORD WILL BEGIN WITH NO. ";R
230 PRINT:PRINT"PRESS =SPACEBAR= TO CONTINUE . . . ";:
    GOSUB 9000
240 CLS: PRINTTAB(15)". . . NAME/ADDRESS FILE INPUT . . .
    ": PRINT
250 PRINT"TYPE/ENTER INFORMATION AT '?' PROMPT (USE NO
    COMMAS),"
260 PRINT"OR WORD 'END' AT NAME PROMPT TO EXIT INPUT CYCLE"
270 PRINT ST$
280 PRINT"RCD/NAME"; TAB(24)"ADDRESS"; TAB(40)"CITY";
    TAB(54)"STATE-ZIP"
290 PRINT ST$
295 '    ? RECORD NO. AND ESTABLISH LOCATION FOR NAME ENTRY
300 G=448: L=0:'         G=? @ LOCATION, L = LINE COUNTER
310 PRINT @ G, R;: PRINT @ G+3,;: INPUT N$(R)
315 '    PRINT RECORD NO. AND ESTABLISH LOCATION FOR NAME
    ENTRY
320 IF N$(R) = "END" THEN 500 ELSE 330
330 G=G+22: PRINT @ G,;: INPUT A$(R)
335 '    INCREMENT ? @ LOCATION FOR ADDRESS INPUT
340 G=G+16: PRINT @ G,;: INPUT C$(R)
345 '    INCREMENT G FOR CITY NAME INPUT
350 G=G+16: PRINT @ G,;: INPUT S$(R)
355 '    INCREMENT G FOR STATE-ZIP INPUT
360 G=G+10: R=R+1: L=L+1:'       INCREMENT COUNTERS FOR
    NEXT LINE
370 IF L<5 THEN 310 ELSE 400
399 '            FORMATTED CORRECTION ROUTINE
400 PRINT@ G1, "TYPE 1 TO CORRECT AN ENTRY, ELSE 0 =) ";:
    Q=1: GOSUB 9000: X = VAL(Y$)
410 IF X = 0 THEN 420 ELSE 430
420 G=448: PRINT @ G, CHR$(31): GOTO 300
425 '    RESET G, ERASE INPUT FIELD AND RETURN TO INPUT
    CYCLE
430 PRINT @ G1,"TYPE/ENTER RECORD NUMBER TO BE CORRECTED
    =) ";: Q=2: GOSUB 9000: X=VAL(Y$)
440 PRINT @ G1, CHR$(31);
450 PRINT @ G1, "TYPE/ENTER CORRECTED ENTRY AT RECORD
    PROMPT."
460 PRINTX"  ";: INPUT "NAME : ";N$(X)
470 PRINT @ G1, CHR$(31);: PRINT @ G1, X"  ";: INPUT"
    ADDRESS : ";A$(X)
480 PRINT @ G1, CHR$(31);: PRINT @ G1, X"  ";: INPUT"CITY,
    STATE-ZIP : "; C$(X), S$(X)
490 PRINT @ G1, CHR$(31);: GOTO 400
499 '            DISPLAY ROUTINE
500 CLS: PRINTTAB(15)". . . SIMPLIFIED DISPLAY . . .":
    PRINT
510 PRINT"TYPE DISPLAY RECORD STARTING NUMBER =) ";: Q=2:
    GOSUB 9000: X=VAL(Y$)
520 CLS: PRINTTAB(15)". . . NAME/ADDRESS FILE . . .": PRINT
530 FOR N = X TO R-1
540 PRINTN; TAB(5)N$(N); TAB(22)A$(N); TAB(38)C$(N); TAB(53)
    S$(N)
550 NEXT
560 PRINT@ G1, "PRESS =SPACEBAR= TO CONTINUE ";: GOSUB 9000
570 CLS:PRINT"THE FOREGOING PROGRAM IS A SIMPLIFIED VERSION TO"
580 PRINT"DEMONSTRATE A FORMATTED INPUT APPROACH": PRINT:
    PRINT"THE NON-SCROLL INPUT COULD BE USED WITH
    FORMATTED INPUT":
    PRINT"TO MINIMIZE USE OF THE =ENTER= KEY": PRINT
590 PRINT"THIS IS A DEMONSTRATION PROGRAM ONLY.":PRINT:PRINT
    "IT WAS NO INTENDED TO INCLUDE FULL DATA BASE FEATURES.":
    PRINT
600 PRINT:PRINT"PRESS =SPACEBAR= TO CONTINUE, ELSE =BREAK= ";:
    GOSUB 9000: GOTO 30
8000 END
8999 '          BLINKING CURSOR WITH LIMITER
9000 Z$="": Y$="": Q1=0:'          SET VARIABLES TO NULL VALUE
9010 PRINTCHR$(15); CHR$(140);: FORW=1TO20:NEXT: PRINTCHR$(8);
9020 Z$=INKEY$: IFZ$="" THEN PRINT " ";: FORW=1TO20:NEXT:
    PRINTCHR$(8);: GOTO 9010 ELSE 9030
9030 PRINTZ$;: Y$=Y$+Z$: Q1=Q1+1: IF Q1=Q OR Z$=CHR$(32) THEN
    RETURN ELSE 9010
10000 '       --- NON-SCROLLING INPUT WITH CHARACTER LIMITER ---
10010 '
10020 '      --- LINES 10090 TO 10190 ARE TYPICAL PROGRAM LINES
            PRESENTED FOR EXAMPLE AND TRIAL PURPOSES.
10030 '
10040 CLS: PRINT"EXAMPLE OF NON-SCROLLING INPUT":PRINT
10050 PRINT"TYPE/ENTER INFORMATION AFTER LABEL PROMPT":PRINT
10060 PRINT"INPUT WILL AUTOMATICALLY ADVANCE TO THE NEXT
    LABEL"
10070 PRINT"AFTER A PREDETERMINED NUMBER OF CHARACTERS ARE
    TYPED."
10080 PRINT
10090 PRINT "STATE         : ";:'   --- PRINT LABEL
10100 Y = 2:'                       --- SET CHARACTER LIMITER Y
10110 GOSUB 10260:'                 --- GOSUB FOR KEYBOARD INPUT
10120 S$(R) = B$:'                  --- SWAP STRINGS FOR STORAGE
10130 PRINT:'                       --- INSERT LINE FEED
10140 '                             --- REPEAT FOR NEXT LABEL
10150 PRINT:PRINT"ENTER A 5 DIGIT ZIP CODE NUMBER ... ":PRINT
10160 PRINT "ZIP CODE      : ";:'   --- DISPLAY NEXT LABEL
10170 Y = 5:'                       --- SET ZIP CODE LIMITER
10180 GOSUB 10260:'                 --- GOSUB FOR KEYBOARD INPUT
10190 Z$(R) = B$:'                  --- SWAP STRINGS FOR STORAGE
10200 PRINT: PRINT: PRINT TAB(5)S$(R)"  ";Z$(R): PRINT
10210 '          --- LINE 10190 DISPLAY IS FOR TRIAL ONLY ---
10220 PRINT"CHANGING VALUES OF THE LIMIT COUNTER WILL PERMIT":
    PRINT"LONGER INPUT STRINGS THAT INCLUDE COMMAS":PRINT
10230 INPUT"PRESS =ENTER= TO CONTINUE ";Z: GOTO 30
10240 '          ----- INKEY$ (KEYBOARD) INPUT -----
10250 '
10260 A$ = "": B$ = "": X = 0:'  --- SET VARIABLES TO ZERO
10270 A$ = INKEY$: IF A$ = "" THEN 10270ELSE 10280
10280 B$ = B$ + A$:'                --- STORE INPUT IN B$ STRING
10290 PRINT A$;'                    --- DISPLAY KEYBOARD INPUT
10300 X = X + 1:'                   --- INCREMENT LIMIT COUNTER X
10310 '                             --- TEST FOR LIMIT VALUE NEXT
10320 IF Y = X THEN RETURN ELSE 10270
10330 '          --- LOOP BACK FOR NEXT INPUT IF TEST FAILS
```

Fixed-format data entry

This program runs on an Apple II.

continued from page 97

Figure 1. Data input using GET

```
500  VTAB 22: HTAB 1: PRINT "ANOTHER RUN (Y/N)?";: GET A$
510  IF A$ <  > "Y" AND A$ <  > "N" GOTO 500
520  IF A$ = "Y" GOTO 300
```

Figure 2. Interrupting input

```
505  IF A$ = CHR$(N) GOTO 530
```

Figure 3. GET function with loop

```
10   REM ENTER NAME INTO PROGRAM
20  BLANK$ = "                    ": REM 25 BLANKS
30   VTAB 10: HTAB 1: PRINT "NAME ";: INVERSE: PRINT BLANK$
40   FOR I = 5 TO 30: REM GET INPUT AND CONCATENATE
50   VTAB 10: HTAB I: GET A$
60  NAME$ = NAME$ + A$
70   NEXT I

80   NORMAL: REM RESTORES NORMAL PRINTING
```

If you own an Apple™ or are thinking of owning one, here is what you should know about Super-Text™!

Super-Text™ is an easy-to-use word processing program which will dramatically reduce the time it now takes you to do typing, composing, reports, form letters, and many other word processing tasks . . .

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Super-Text™ for the Apple™ II or II Plus with 48 K and disk drive (dual DOS 3.2/3.3). $150. MUSE Software, 330 N. Charles St., Balto., Md. 21201. 301-659-7212.

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CIRCLE 86

Figure 4. String entry routine

```
30 BLANK$ = "                              : REM 25 SPACES
40  HOME
50  VTAB 8: PRINT "NAME"
70  INVERSE
79 I = 8
90  VTAB I: HTAB 6: PRINT BLANK$
159  DIM A$(23)
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27): REM  ESCAPE CHARACTER FOR PROGRAM
    ABORT
210 BELL$ =  CHR$ (7): REM  CTRL-G FOR BELL
300 I = 0: REM CURSOR COUNTER
309  VTAB 8: HTAB I + 6: GET A$: PRINT A$
320  IF A$ = CR$ GOTO 400
329  IF A$ = ES$ GOTO 460
340  IF A$ = LA$ THEN I = I - 2
350  IF A$ <  > RA$ AND A$ <  > LA$ THEN A$(I) = A$
360 I = I + 1
370  IF I < 0 THEN I = 0: REM  ELIMINATE TABBING OFF THE
    SCREEN
379  IF I = 19 THEN  PRINT BELL$
389  IF I < 22 GOTO 310
400  FOR K = 0 TO I : REM NO NEED TO INCREMENT COUNTER
    EXTRA 22-I TIMES
409 ST$ = ST$ + A$(K)
420 A$(K) = " ": REM    SET ARRAY TO EMPTY
430  NEXT K
460  NORMAL
470  VTAB 23
480  VTAB 21: HTAB 1: PRINT "INPUT STRING IS '";ST$;"'"
490 ST$ = ""
500  VTAB 22: HTAB 1: PRINT "ANOTHER RUN (Y/N)?";: GET A$
510  IF A$ <  > "Y" AND A$ <  > "N" GOTO 500
520  IF A$ = "Y" GOTO 300
530  END
```

Figure 5. Address entry

```
10 A(0) = 6:A(1) = 6:A(2) = 6:A(3)  = 23:A(4)  = 15:  REM
    STARTING LOCATION
20 B(0) = 22:B(1) = 22:B(2) = 22:B(3) = 5:B(4) = 17:  REM
    LENGTH OF FIELDS
30 BLANK$ = "                          ": REM 25 SPACES
40  HOME
50  VTAB 8: PRINT "NAME";:  HTAB 30:  PRINT "DATA":  VTAB
    11: PRINT "ADDR";
60  HTAB 30: PRINT "SIZE": VTAB 17: HTAB 19: PRINT "ZIP":
    VTAB 20: HTAB 10: PRINT "TEL#"
70  INVERSE
80  FOR I = 8 TO 14 STEP 3: REM PRINT FIELDS
90  VTAB I: HTAB 6: PRINT BLANK$
100  NEXT I
110  VTAB 8: HTAB 35: PRINT  LEFT$ (BLANK$,5)
120  VTAB 11: HTAB 35: PRINT  LEFT$ (BLANK$,5)
130  VTAB 17: HTAB 23: PRINT  LEFT$ (BLANK$,5)
140  VTAB 20: HTAB 15: PRINT  LEFT$ (BLANK$,17)
150  VTAB 1: HTAB 5: PRINT "NUMBER OF RECORDS";: HTAB 23:
    INPUT "";SIZE: VTAB 1: HTAB 5: NORMAL: PRINT BLANK$:
    INVERSE
160  DIM NAME$(SIZE,4),A$(23)
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27):   REM  ESCAPE CHARACTER FOR PROGRAM
    ABORT
210 BELL$ =  CHR$ (7): REM  CTRL-G FOR BELL
220  FOR N = 1 TO SIZE: VTAB 11: HTAB 36: PRINT N
230  FOR I = 8 TO 14 STEP 3
240  VTAB I: HTAB 6: PRINT BLANK$
250  NEXT I
260  VTAB 8: HTAB 35: PRINT  LEFT$ (BLANK$,5)
270  VTAB 17: HTAB 23: PRINT  LEFT$ (BLANK$,5)
```

Figure 6. Different length fields

Starting values

```
1010 A(1) = 1: A(2) = 18: A(3) = 25
```

Ending values

```
1020 B(1) = 15: B(2) = 23: B(3) =39
```

Figure 7. Vertical tabbing

```
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27): REM  ESCAPE CHARACTER FOR PROGRAM ABORT
1000  DIM A$(40)
1010 A(1) = 1:A(2) = 18:A(3) = 25
1020 B(1) = 15:B(2) = 23:B(3) = 39
1030  FOR K = 1 TO 3: REM  LOOP FOR 3 FIELDS
1040 I = A(K)
1050  VTAB X: HTAB I: GET A$: PRINT A$
1060  IF A$ = CR$ GOTO 1140
1070  IF A$ = ES$ GOTO 1190
1080  IF A$ = LA$ THEN I = I - 2
1090  IF A$ <  > LA$ OR A$ <  > RA$ THEN A$(I) = A$
1100 I = I + 1
1110  IF I < A(K) THEN I = A(K)
1120  IF I = B(K) - 3 THEN  PRINT BELL$
1130  IF I <  = B(K) GOTO 1050
1140  FOR J = A(K) TO (I + 1 - A(K))
1150 ST$(K) = ST$(K) + A$(J)
1160 A$(J) = " "  : REM  BLANK
1170  NEXT J
1180  NEXT K
1190  END
```

Figure 8. Data verifying routine

```
IF ASC(A$) > 31 AND ASC(A$) < 95 GOTO ___
```

Figure 9. Matrix entry

```
      MATRIX ENTRY


1  REM      MATRIX DATA ENTRY
2  REM      BY MARTY NEMZOW @1981
3  REM
4  REM
5  HOME :  VTAB 4:  HTAB 10:  PRINT "NETWORKS":  VTAB 10:
   HTAB 8: PRINT "DATA ENTRY DEMO"
6  VTAB 19: CALL  - 958: VTAB 23: HTAB 1
7  PRINT "ENTER  SIZE OF MATRIX (0<SIZE<12)";:   VTAB 23:
   INPUT SIZE
8  IF SIZE < 0 OR SIZE > 13 THEN  GOTO 6
9  GOSUB 1200
10  GOSUB 700
11  GOSUB 800
12  VTAB 19: CALL  - 958
500  VTAB 22: HTAB 1: PRINT "ANOTHER RUN (Y/N)?";: GET A$
510  IF A$ <  > "Y" AND A$ <  > "N" GOTO 500
519  IF A$ = "Y" GOTO 9
599  POKE 34,0: END
700  REM  SUBROUTINE= MATRIX DISPLAY
705  REM  UNIT DISTANCE BETWEEN NODES ASSUMED
710  HOME : POKE 34,0: REM  SET WINDOW FULL
715  VTAB 1: PRINT "    MATRIX REPRESENTATION"
720  FOR I = 1 TO SIZE: HTAB 2 * I + 4
725  PRINT I;
730  NEXT I
735  PRINT
740  VTAB 3: HTAB 4: PRINT LEFT$
     ("+---------------------------------",SIZE * 2 + 2);"+"
745  VTAB 4: HTAB 4: PRINT "!";: HTAB SIZE * 2 + 6: PRINT
   "!"
750  FOR I = 1 TO SIZE
755  VTAB I + 4: PRINT I;: HTAB 3: PRINT " !";
760  FOR J = 1 TO SIZE
765  HTAB 2 * J + 4: PRINT A(I,J)
770  NEXT J
775  PRINT " !": REM NOTE SPACE BEFORE ! AS LINE 755
780  NEXT I
785  VTAB I + 4: HTAB 4:  PRINT "!";:  HTAB SIZE * 2 + 6:
     PRINT "!"
790  HTAB I + 5: HTAB 4: PRINT LEFT$
     ("+---------------------------------",SIZE * 2 + 2);"+"
795  POKE 34,19:   RETURN :  REM  SET  WINDOW HALF BEFORE
     RETURN
800  REM  MATRIX CORRECTION AND ALTERATION ROUTINE
810  VTAB 21: CALL  - 958: HTAB 1
815  VTAB 22: PRINT "IS THIS CORRECT?";: GET A$: PRINT A$
820  IF A$ = "Y" THEN  RETURN
825  IF A$ <  > "N" GOTO 815
830  VTAB 19: CALL  - 958
835  HTAB 1: PRINT "WHICH ENTRIES DO YOU WISH TO FIX?"
840  HTAB 15: INVERSE : PRINT "A";: NORMAL : PRINT ")LL"
```

```
845  HTAB 15: FLASH : PRINT "R";: NORMAL : PRINT ")OW"
850  HTAB  15:  INVERSE :  PRINT "C";:  NORMAL  :  PRINT
     ")OLUMN"
855   HTAB 15:   FLASH :   PRINT "S";:   NORMAL :   PRINT
     ")PECIFIC"
860  VTAB 19: HTAB 34: GET A$
865  VTAB 19: HTAB 1: CALL  - 958
870 A = (A$ = "S") + 2 * (A$ = "R") + 3 * (A$ = "C")  + 4
    * (A$ = "A")
875  IF A = 0 GOTO 830
880  ON A GOSUB 905,1005,1105,1200
885  GOTO 810
900  REM  SUBROUTINE= SPECIFIC ENTRY CORRECTION
905  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
910  INPUT "ROW: ";I: FOR W = 1 TO 100: NEXT
915  INPUT "COLUMN:";J
920  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
925  IF (I > 0) AND (I <  = SIZE) AND (J > 0) AND (J <  =
    SIZE) GOTO 935
930  PRINT  CHR$ (7): VTAB 23: PRINT "OUT OF BOUNDS": FOR
     W = 1 TO 200: NEXT : GOTO 905
935  VTAB I + 4: HTAB J * 2 + 4
940  GET A$
945  IF A$ =  CHR$ (13) GOTO 965
950  IF A$ <  > "0" AND A$ <  > "1" GOTO 935

955 A(I,J) =  VAL (A$)
960  PRINT A(I,J);
965  VTAB 23: HTAB 1: PRINT "MORE?";: GET A$
970  IF A$ = "Y" GOTO 905
975  IF A$ <  > "N" GOTO 965
980  RETURN
1000  REM  SUBROUTINE= ROW CORRECTION
1005  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
1010  INPUT "ROW NUMBER TO BE ALTERED: ";I
1015  IF (I > 0) AND (I <  = SIZE) GOTO 1025
1020  PRINT  CHR$ (7):  VTAB  23:  PRINT "OUT OF BOUNDS":
      FOR W = 1 TO 350: NEXT : GOTO 1005
1025  VTAB I + 4
1030  FOR J = 1 TO SIZE: HTAB 2 * J + 4
1035  GET A$
1040  IF A$ =  CHR$ (21) GOTO 1065
1045  IF A$ <  >  CHR$ (8) GOTO 1055
1050 J = J - 2: GOTO 1065
1055 A(I,J) =  VAL (A$)
1060  PRINT A(I,J);
1065  NEXT J
1070  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
1075  PRINT "MORE ROWS?";: GET A$: PRINT A$
1080  IF A$ = "Y" GOTO 1005
1085  IF A$ <  > "N" GOTO 1070
1090  RETURN
1100  REM  SUBROUTINE= COLUMN CORRECTION
1105  VTAB 19: CALL  - 958: VTAB 22: HTAB 1
1110  INPUT "COLUMN NUMBER TO BE ALTERED: ";J
1115  IF (J > 0) AND (J <  = SIZE) GOTO 1125
1120  PRINT  CHR$ (7):  VTAB  23:  PRINT "OUT OF BOUNDS":
      FOR W = 1 TO 350: NEXT : GOTO 1105
1125  FOR I = 1 TO SIZE: VTAB I + 4
1130  HTAB 2 * J + 4
1135  GET A$
1140  IF A$ =  CHR$ (21) GOTO 1165
1145  IF A$ <  >  CHR$ (8) GOTO 1155
1150 I = I - 2: GOTO 1165
1155 A(I,J) =  VAL (A$)
1160  PRINT A(I,J);
1165  NEXT I
1170  VTAB 22: HTAB 1: CALL  - 958
1175  PRINT "MORE COLUMNS?";: GET A$: PRINT A$
1180  IF A$ = "Y" GOTO 1105
1185  IF A$ <  > "N" GOTO 1170
1190  RETURN
1200  VTAB 19: HTAB 1: CALL  - 958:  PRINT "ENTER ENTRIES
      BY ROW" R W = 1 TO 1000: NEXT
1210  POKE 34,0: HOME : VTAB 22: INVERSE : HTAB 15:  PRINT
      "DATA ENTRY": NORMAL
1220  VTAB 23: PRINT "KEYS '<-' AND '->' ARE ACTIVE"
1225  FOR I = 1 TO SIZE: VTAB I + 4: PRINT I;
1230  FOR J = 1 TO SIZE: HTAB J * 2 + 2
1235  PRINT "_";: NEXT J: PRINT : NEXT I
1240  VTAB 3: FOR J = 1 TO SIZE: HTAB J * 2 + 2
1245  PRINT J;: NEXT : PRINT
1250 I = 0
1255 I = I + 1: VTAB I + 4: PRINT I;":";:J = 0
1260 J = J + 1
1265  VTAB I + 4: HTAB 2 * J + 2: PRINT A(I,J);: HTAB 2 *
     J + 2: GET A$
1270  IF A$ =  CHR$ (27) THEN  RETURN
1275  IF A$ = "0" OR A$ = "1" GOTO 1315
1280  IF A$ =  CHR$ (21) GOTO 1320
1285  IF A$ <  >  CHR$ (8) GOTO 1265
1290 J = J - 2
1295  IF J >  - 1 GOTO 1325
1300 I = I - 1:J = SIZE - 1
1305  IF I > 0 GOTO 1325
1310 I = 1:J = 0: PRINT CHR(7): GOTO 1325
1315 A(I,J) =  VAL (A$)
1320  VTAB I + 4: HTAB 2 * J + 2: PRINT A(I,J)
1325  IF J < SIZE GOTO 1260
1330  IF I < SIZE GOTO 1255
1335  RETURN
```

Figure 10. Instruction set

```
VTAB 19 : CALL -958 : HTAB 1 : VTAB X
```

Figure 11. Loop routine for symmetric matrices

```
 FOR I = 1 TO SIZE
 FOR J = I TO SIZE: REM NO MISPRINT - COUNTER STARTS AT I
 GET A
A(I,J) = A
A(J,I) = A(I,J)
 NEXT J
 NEXT I
```

```
?SYNTAX ERROR
]LIST

1 X = 4: HOME
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27): REM  ESCAPE CHARACTER FOR PROGRAM ABORT
210 BELL$ =  CHR$ (7): REM  CTRL-G FOR BELL
1000  DIM A$(40)
1010 A(1) = 1:A(2) = 18:A(3) = 25
1020 B(1) = 15:B(2) = 23:B(3) = 39
1030  FOR K = 1 TO 3: REM  LOOP FOR 3 FIELDS
1040 I = A(K)
1050  VTAB X: HTAB I: GET A$: PRINT A$: REM  X IS SET OUTSIDE
      THE ROUTINE
1060  IF A$ = CR$ GOTO 1140
1070  IF A$ = ES$ GOTO 1190
1080  IF A$ = LA$ THEN I = I - 2
1090  IF A$ <  > LA$ AND A$ <  > RA$ THEN A$(I) = A$
1100 I = I + 1
1110  IF I < A(K) THEN I = A(K)
1120  IF I = B(K) - 3 THEN  PRINT BELL$
1130  IF I <  = B(K) GOTO 1050
1140  FOR J = A(K) TO I - 1: REM  NOTE FOR FIXED LENGTH STRINGS
1141  REM  USE "FOR J = A(K) TO B(K)"
1150 ST$(K) = ST$(K) + A$(J)
1160 A$(J) = " ": REM  BLANK
1170  NEXT J
1180  NEXT K
1190  END

]

]

]

]

]

?SYNTAX ERROR
]LIST

30 BLANK$ = "                                        ": REM  25 SPACES
40  HOME
50  VTAB 8: PRINT "NAME"
79 I = 8
90  VTAB I: HTAB 6: PRINT BLANK$
159  DIM A$(23)
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27): REM  ESCAPE CHARACTER FOR PROGRAM ABORT
210 BELL$ =  CHR$ (7): REM  CTRL-G FOR BELL
300 I = 0: VTAB 8: HTAB 6: INVERSE : PRINT BLANK$: VTAB 21:
     CALL  - 958
309  VTAB 8: HTAB I + 6: GET A$: PRINT A$
```

```
320  IF A$ = CR$ GOTO 400
330  IF A$ = ES$ GOTO 440
340  IF A$ = LA$ THEN I = I - 2
350  IF A$ <  > RA$ AND A$ <  > LA$ THEN A$(I) = A$
360 I = I + 1
370  IF I < 0 THEN I = 0: REM  ELIMINATE TABBING OFF THE
     SCREEN
380  IF I = (B(J) - 3) THEN  PRINT BELL$
390  IF I < B(J) GOTO 310
400  FOR K = 0 TO I: REM  NO NEED TO INCREMENT COUNTER
     EXTRA 22-I TIMES
409 ST$ = ST$ + A$(K)
420 A$(K) = " ": REM  SET ARRAY TO EMPTY
430  NEXT K
460  NORMAL
470  VTAB 23
479  VTAB 21: HTAB 1: PRINT "INPUT STRING IS '";ST$;"'"
489 ST$ = ""
490  FOR J = 0 TO 4
499  VTAB 22: HTAB 1: PRINT "ANOTHER RUN (Y/N)?";: GET A$
510  IF A$ <  > "Y" AND A$ <  > "N" GOTO 499
520  IF A$ = "Y" GOTO 300
530  END


]

]

]

]
]

?SYNTAX ERROR
]

]

]LIST

10 A(0) = 6:A(1) = 6:A(2) = 6:A(3) = 23:A(4) = 15
20 B(0) = 22:B(1) = 22:B(2) = 22:B(3) = 5:B(4) = 17
30 BLANK$ = "                              "
40  HOME
50  VTAB 8: PRINT "NAME";: HTAB 30: PRINT "DATA": VTAB 11:
    PRINT "ADDR";
60  HTAB 30: PRINT "SIZE": VTAB 17: HTAB 19: PRINT "ZIP":
    VTAB 20: HTAB 10 : PRINT "TEL#"
70  INVERSE
80  FOR I = 8 TO 14 STEP 3
90  VTAB I: HTAB 6: PRINT BLANK$
100  NEXT I
110  VTAB 8: HTAB 35: PRINT  LEFT$ (BLANK$,5)
120  VTAB 11: HTAB 35: PRINT  LEFT$ (BLANK$,5)
130  VTAB 17: HTAB 23: PRINT  LEFT$ (BLANK$,5)
140  VTAB 20: HTAB 15: PRINT  LEFT$ (BLANK$,17)
150  VTAB 1: HTAB 5: PRINT "NUMBER OF RECORDS";: HTAB 23:
     INPUT "";SIZE: VTAB
     1: HTAB 5: NORMAL : PRINT BLANK$: INVERSE
160  DIM NAME$(SIZE,4),A$(23)
170 LA$ =  CHR$ (8): REM  LEFT ARROW
180 RA$ =  CHR$ (21): REM  RIGHT ARROW
190 CR$ =  CHR$ (13): REM  CARRAIGE RETURN
200 ES$ =  CHR$ (27): REM  ESCAPE CHARACTER FOR PROGRAM
    ABORT
210 BELL$ =  CHR$ (7): REM  CTRL-G FOR BELL
220  FOR N = 1 TO SIZE: VTAB 11: HTAB 36: PRINT N
230  FOR I = 8 TO 14 STEP 3
240  VTAB I: HTAB 6: PRINT BLANK$
250  NEXT I
260  VTAB 8: HTAB 35: PRINT  LEFT$ (BLANK$,5)
270  VTAB 17: HTAB 23: PRINT  LEFT$ (BLANK$,5)
280  VTAB 20: HTAB 15: PRINT  LEFT$ (BLANK$,17)
290  FOR J = 0 TO 4
300 I = 0
310  VTAB (8 + 3 * J): HTAB I + A(J): GET A$: PRINT A$
320  IF A$ = CR$ GOTO 400
329  IF A$ = ES$ GOTO 460
330  IF A$ = ES$ GOTO 440
340  IF A$ = LA$ THEN I = I - 2
350  IF A$ <  > RA$ AND A$ <  > LA$ THEN A$(I) = A$
360 I = I + 1
370  IF I < 0 THEN I = 0: REM  ELIMINATE TABBING
     OFF THE SCREEN
379  IF I = 19 THEN  PRINT BELL$
380  IF I = (B(J) - 3) THEN  PRINT BELL$
389  IF I < 22 GOTO 309
390  IF I < B(J) GOTO 310
400  FOR I = 0 TO 22
410 NAME$(N,J) = NAME$(N,J) + A$(I)
420 A$(I) = " ": REM    SET ARRAY TO EMPTY
430  NEXT I
440  NEXT J
450  NEXT N
460  NORMAL
470  VTAB 23
480  FOR N = 0 TO SIZE
490  FOR J = 0 TO 4
500  PRINT NAME$(N,J): NEXT J: NEXT N


]8
]
]

?SYNTAX ERROR
]LIST

1  REM      MATRIX DATA ENTRY
2  REM      BY MARTY NEMZOW @1981
3  REM
4  DIM A(12,12): REM  DIMENSION MATRIX
5  HOME : VTAB 4: HTAB 10: PRINT "NETWORKS": VTAB 10: HTAB 8:
   PRINT "DATA ENTRY DEMO"
6  VTAB 19: CALL  - 958: VTAB 23: HTAB 1
7  PRINT "ENTER SIZE OF MATRIX (0<SIZE<12)";: VTAB 23:
   INPUT SIZE
8  IF SIZE < 1 OR SIZE > 12 THEN 6
9  GOSUB 1200
10  GOSUB 700
11  GOSUB 800
12  VTAB 19: CALL  - 958
500  VTAB 22: HTAB 1: PRINT "ANOTHER RUN (Y/N)?";: GET A$
510  IF A$ <  > "Y" AND A$ <  > "N" THEN 500
519  IF A$ = "Y" THEN 6
599  POKE 34,0: END
700  REM  SUBROUTINE= MATRIX DISPLAY
705  REM  UNIT DISTANCE BETWEEN NODES ASSUMED
710  HOME : POKE 34,0: REM  SET WINDOW FULL
715  VTAB 1: PRINT "    MATRIX REPRESENTATION"
720  FOR I = 1 TO SIZE: HTAB 2 * I + 4
725  PRINT I;
730  NEXT I
735  PRINT
740  VTAB 3: HTAB 4: PRINT  LEFT$ ("+----------------------
     ----------------------",SIZE * 2 + 2);"+"
745  VTAB 4: HTAB 4: PRINT "!";: HTAB SIZE * 2 + 6: PRINT "!"
750  FOR I = 1 TO SIZE
755  VTAB I + 4: PRINT I;: HTAB 3: PRINT " !";
760  FOR J = 1 TO SIZE
765  HTAB 2 * J + 4: PRINT A(I,J);
770  NEXT J
775  PRINT " !"
780  NEXT I
785  VTAB I + 4: HTAB 4: PRINT "!";: HTAB SIZE * 2 + 6:
   PRINT "!"
790  HTAB I + 5: HTAB 4: PRINT  LEFT$ ("+------------------
     ----------",SIZE * 2 + 2);"+"
795  POKE 34,19: RETURN : REM  SET WINDOW HALF BEFORE RETURN
800  REM  MATRIX CORRECTION AND ALTERATION ROUTINE
805  IF (FLAG) THEN  GOSUB 200
810  VTAB 21: CALL  - 958: HTAB 1
815  VTAB 22: PRINT "IS THIS CORRECT?";: GET A$: PRINT A$
820  IF A$ = "Y" THEN  RETURN
825  IF A$ <  > "N" GOTO 815
830  VTAB 19: CALL  - 958
835  HTAB 1: PRINT "WHICH ENTRIES DO YOU WISH TO FIX?"
840  HTAB 15: INVERSE : PRINT "A";: NORMAL : PRINT ")LL"
845  HTAB 15: FLASH : PRINT "R";: NORMAL : PRINT ")OW"
850  HTAB 15: INVERSE : PRINT "C";: NORMAL : PRINT ")OLUMN"
855  HTAB 15: FLASH : PRINT "S";: NORMAL : PRINT ")PECIFIC"
860  VTAB 19: HTAB 34: GET A$
865  VTAB 19: HTAB 1: CALL  - 958
870 A = (A$ = "S") + 2 * (A$ = "R") + 3 * (A$ = "C") + 4 *
    (A$ = "A")
875  IF A = 0 GOTO 830
880  ON A GOSUB 905,1005,1105,1200
885  GOTO 805
900  REM  SUBROUTINE= SPECIFIC ENTRY CORRECTION
905  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
910  INPUT "ROW: ";I: FOR W = 1 TO 100: NEXT
915  INPUT "COLUMN:";J
920  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
     = SIZE) GOTO 935
925  IF (I > 0) AND (I <  = SIZE) AND (J > 0) AND (J <
930  PRINT "": VTAB 23: PRINT "OUT OF BOUNDS": FOR W = 1
     TO 20: NEXT : GOTO 905
935  VTAB I + 4: HTAB J * 2 + 4
940  GET A$
```

THE INCREDIBLE PRINTING MACHINE

typrinter 221

IMAGINE a computer printer/electronic typewriter with a 100 character daisy wheel, controlled by 6 microprocessors (including 2 Z-80's) with an all-electronic keyboard...all in one machine!
THAT'S INCREDIBLE!
THAT'S THE TYPRINTER 221!

AUTOMATICALLY, IT WILL:

Center copy.
Line up decimal points.
Print vertical lines (to separate columns).
Layout columns.
Center titles (over a column).
Print flush right.
Return carriage (at end of line).
Paper feed to pre-set starting point.
Indicate end of page.
Set tabs from one to many.
Clear tabs from one to all.
Set temporary margins (wherever you like) as often as needed.
Repeat all typing keys as needed.
Underline copy.
Print bold face and underline.
Do reverse print (white on black), sort of "reverse Video".
Allow alphabetic and decimal tabulation.
Indent paragraphs.
Store in non-volatile resident memory:
- Often used line formats (margins & tab stops).
- Often used phrases (up to 835 characters) in 10 "bins".
- Up to 10 complete forms (tax, medical, insurance, etc.).
- Up to 14,000 characters in an additional 26 "bins*".

Print perfectly spaced proportional letters.
Return to typing position after correction with relocation key.
Allow one character to overlap another (Ø).
Right margin justification.
Print two columns with both right and left margins justified and the center ragged.
Lift off errors (from single character to entire line).

*Optional at extra cost.

IT WILL EVEN:

Allow a carriage return without a linefeed or a linefeed without a carriage return.
Allow you to pre-set an impression control for high-quality carbon copies.
Allow both vertical and horizontal half-spacing.
Allow cancellation of copy before printing.
Allow express and normal backspacing.
Print in four different sizes: 10 pitch pica, 12 pitch elite, 15 pitch micron.
Allow insertion of a missing character in an already printed line.
Accept paper up to 17" wide.

Backspace 1/10, 1/12, 1/15 or even 1/60 of an inch.
Buffer and print out one word at a time, or one line or as many as 10 pages*.
Print up to 198 columns.
Do 1/2 line spacing for footnotes and scientific notation.
Accepts carbon film or reusable nylon ribbons.

IT HAS:

A lighted key to inform you that it's set to temporary margin.
A factory installed noise reduction shield.
A 16K buffer/automatic spooler*.
A lighted key to indicate upper case only.
A Centronics standard parallel interface and can be ordered with:

RS-232 Serial interface* or
IEEE (PET) interface*.

A print speed of 20 cps and (because of logic seeking circuitry) a through-put of approx. 32 cps.
A built-in anti-glare shield.

IT EVEN HAS:

Carbon film ribbons in various colors.
20 character plasma readout that informs you as to:
- Number of characters to end of line.
- Number of lines left to end of page.
- The existence of an error condition.
- The contents of a memory "bin".
- Number of characters left in buffer.

An automatic "feature in use" indicator (centering, storage, etc.)
With scrolling, both FORWARD and BACKWARDS.

INCREDIBLE?

THE 221 OFFERS EVEN MORE!

It's totally compatible with all computers and software.
It will print in English, French, Spanish, Italian and German. It will automatically switch between English and foreign keyboards*. (Under computer control).
Scientific, mathematic, financial and legal daisy wheels available*.
Tractor feed available*.
Can be used as a stand-alone terminal*.
Can be used to access both TWX and TELEX networks*.

TRY WHAT YOU'VE BEEN MISSING.
TRY THE INCREDIBLE MACHINE.
TRY THE TYPRINTER 221.

Dealer inquiries invited.
(Call for store nearest you).

Service available through the world-wide facilities of the Olivetti Corporation.

HOWARD INDUSTRIES

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CIRCLE 88

```
945  IF A$ =  CHR$ (13)`GOTO 965
950  IF A$ <  > "0" AND A$ <  > "1" GOTO 935
955 A(I,J) =  VAL (A$)
960  PRINT A(I,J);
965  VTAB 23: HTAB 1: PRINT "MORE?";: GET A$
970  IF A$ = "Y" GOTO 905
975  IF A$ <  > "N" GOTO 965
980  RETURN
1000  REM  SUBROUTINE= ROW CORRECTION
1005  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
1010  INPUT "ROW NUMBER TO BE ALTERED: ";I
1015  IF (I > 0) AND (I <  = SIZE) GOTO 1025
1020  PRINT "": VTAB 23: PRINT "OUT OF BOUNDS": FOR W = 1
      TO 350: NEXT : GOTO  1005
1025  VTAB I + 4
1030  FOR J = 1 TO SIZE: HTAB 2 * J + 4
1035  GET A$
1040  IF A$ =  CHR$ (21) GOTO 1065
1045  IF A$ <  >  CHR$ (8) GOTO 1055
1050 J = J - 2: GOTO 1065
1055 A(I,J) =  VAL (A$)
1060  PRINT A(I,J);
1065  NEXT J
1070  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
1075  PRINT "MORE ROWS?";: GET A$: PRINT A$
1080  IF A$ = "Y" GOTO 1005
1085  IF A$ <  > "N" GOTO 1070
1090  RETURN
1100  REM  SUBROUTINE= COLUMN CORRECTION
1105  VTAB 19: CALL  - 958: VTAB 22: HTAB 1
1110  INPUT "COLUMN NUMBER TO BE ALTERED: ";J
1115  IF (J > 0) AND (J <  = SIZE) GOTO 1125
1120  PRINT "": VTAB 23: PRINT "OUT OF BOUNDS": FOR W =
      1 TO 350: NEXT : GOTO 1105
1125  FOR I = 1 TO SIZE: VTAB I + 4
1130  HTAB 2 * J + 4
1135  GET A$
1140  IF A$ =  CHR$ (21) GOTO 1165
1145  IF A$ <  >  CHR$ (8) GOTO 1155
1150 I = I - 2: GOTO 1165
1155 A(I,J) =  VAL (A$)
1160  PRINT A(I,J);
1165  NEXT I
1170  VTAB 22: HTAB 1: CALL  - 958
1175  PRINT "MORE COLUMNS?";: GET A$: PRINT A$
1180  IF A$ = "Y" GOTO 1105
1185  IF A$ <  > "N" GOTO 1170
1190  RETURN
1200  VTAB 19: HTAB 1: CALL  - 958: PRINT "ENTER ENTRIES
      BY ROW"
1205  FOR W = 1 TO 1000: NEXT
1210  POKE 34,0: HOME : VTAB 22: INVERSE : HTAB 15: PRINT
      "DATA ENTRY": NORMAL
1215  HTAB 7
1220  VTAB 23: PRINT "KEYS '<-' AND '->' ARE ACTIVE"
1225  FOR I = 1 TO SIZE: VTAB I + 4: PRINT I;
1230  FOR J = 1 TO SIZE: HTAB J * 2 + 2
1235  PRINT " ";: NEXT J: PRINT : NEXT I
1240  VTAB 3: FOR J = 1 TO SIZE: HTAB J * 2 + 2
1245  PRINT J;: NEXT : PRINT
1250 I = 0
1255 I = I + 1: VTAB I + 4: PRINT I;":";:J = 0
1260 J = J + 1
1265  VTAB I + 4: HTAB 2 * J + 2: PRINT A(I,J);: HTAB 2 *
      J + 2: GET A$
1270  IF A$ =  CHR$ (27) THEN  RETURN
1275  IF A$ = "0" OR A$ = "1" GOTO 1315
1280  IF A$ =  CHR$ (21) GOTO 1320
1285  IF A$ <  >  CHR$ (8) GOTO 1265
1290 J = J - 2
1295  IF J >  - 1 GOTO 1325
1300 I = I - 1:J = SIZE - 1
1305  IF I > 0 GOTO 1325
1310 I = 1:J = 0: PRINT "": GOTO 1325
1315 A(I,J) =  VAL (A$)
1320  VTAB I + 4: HTAB 2 * J + 2: PRINT A(I,J)
1325  IF J < SIZE GOTO 1260
1330  IF I < SIZE GOTO 1255
1335  RETURN
10100  NEXT J
10200  NEXT I
10300 BIT = 1:HOLD = SUM: GOSUB 600
10400  IF (SUM > HOLD) GOTO 13100
10500  PRINT "DECREASE IN NETWORK LENGTH IS "; LEFT$ ( STR$
       (1 - SUM / HOL D),3);"%"
10600  VTAB 23: HTAB 1: PRINT "NEW NETWORK DISPLAY?";:
       GET A$
10700  IF A$ = "N" GOTO 11000
10800  IF A$ <  > "Y" GOTO 10600
10900  GOSUB 700
11000  VTAB 19: HTAB 1: CALL  - 958
11100  VTAB 22: HTAB 1: PRINT "SAVE ARRAY TO DISK (Y/N)?";
       : GET A$
11200  IF A$ <  > "Y" GOTO 12900
11300  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
11400  INPUT "ENTER NAME OF ARRAY:";A$
11500  VTAB 19: CALL  - 958: HTAB 1: VTAB 22
11600  PRINT "ARRAY: ";A$
11700  PRINT "IS THIS CORRECT (Y/N)?";: GET B$
11800  IF B$ <  > "Y" GOTO 11300
11900  PRINT D$;"OPEN";A$
12000  PRINT D$;"WRITE";A$
12100  PRINT SIZE
12200  FOR I = 1 TO SIZE: FOR J = 1 TO SIZE
12300  PRINT B(I,J);","
12400  NEXT J
12500  PRINT
12600  NEXT I
12700  PRINT D$;"CLOSE";A$;":ARRAY"
12800  GOTO 13100
12900  PRINT : PRINT "DOUBLE CHECK ON SAVING ARRAY (Y/N)?"
       ;: GET A$
13000  IF A$ <  > "N" GOTO 11000
13100  POKE 34,0: END
```

Meal planning and shopping

This program runs on a TRS-80 Model I.

continued from page 102

```
1000 '*********************************
1010 '   MENU/SHOPPING LIST PROGRAM   *
1020 '                                *
1030 '        COPYRIGHT (C) 1981      *
1040 '                BY              *
1050 '           DUANE R. HOPE        *
1060 '                                *
1070 '*********************************
1080 CLEAR 6500
1090 DEFINT G,E,S
1100 DIM GF(125,1),GF$(125,3),RF$(50,3),E(20,2),SL(20),
     GL$(100,3),GL(100)
```

```
1110 CLS
1120 PRINT TAB(15) "CANDY'S MENU / SHOPPING LIST PROGRAM"
1130 PRINT
1140 PRINT"01  SELECT MEALS"
1150 PRINT"02  FILE MAINTAIN RECIPES"
1160 PRINT"03  FILE MAINTAIN INGREDIENTS"
1170 PRINT"04  LIST RECIPES"
1180 PRINT"05  LIST INGREDIENTS"
1190 PRINT"06  LOAD INGREDIENTS & RECIPES"
1200 PRINT"07  SAVE INGREDIENTS & RECIPES"
1210 PRINT:PRINT
1220 F=0:INPUT"ENTER DESIRED FUNCTION";F
1230 IF F<1ORF>7 GOTO 1110
1240 ON F GOSUB 1260 ,1980 ,2890 ,3450 ,3630 ,4530 ,4250
1250 GOTO 1110
1260 '****************
1270 ' SELECT MEALS *
1280 '****************
1290 A$="":INPUT"WOULD YOU LIKE TO LIST MENU SELECTIONS
     (Y/N)";A$
1300 IF A$<>"Y"GOTO 1380
1310 CLS:PRINT TAB(5)"MENU SELECTIONS":PRINT
1320 IFRC=0PRINT"NO SELECTIONS AVAILABLE":INPUT"HIT
     ENTER TO RETURN";A$:RETURN
1330 FORI=1TO125:GF(I,1)=0:NEXTI
1340 FORI=1TORC
1350 PRINT I;".) ";RF$(I,1)
1360 NEXTI
1370 PRINT" "
1380 MM=0:FORI=1TO125:GF(I,1)=0:NEXTI
1390 M$="":INPUT"ENTER MEAL DESIRED";M$
1400 IF MM=0 AND M$="" RETURN
1410 IF M$="" GOTO1530
1420 MM=MM+1
1430 GOSUB 4140 ' FIND RECIPE
1440 IF R=0 PRINT M$;" NOT FOUND":GOTO 1390
1450 SL(MM)=R:I=R
1460 GOSUB 4000 ' UNPARSE RECIPE
1470 FOR CC=1TOK
1480 GF(E(CC,1),1)=GF(E(CC,1),1)+E(CC,2)
1490 NEXT CC
1500 GOTO 1390
1510 '*********************************
1520 ' PRINT LIST OF MEALS SELECTED *
1530 '*********************************
1540 DATE$="":INPUT"ENTER DATE FOR THESE MEAL SELECTIONS";
     DATE$
1550 HC$="":INPUT"DO YOU WANT HARD COPY (Y/N)";HC$
1560 CLS:PRINT TAB(5) "SELECTED MEALS FOR WEEK OF ";
     DATE$:PRINT
1570 FORI=1TOMM
1580 PRINT RF$(SL(I),1);" - ";RF$(SL(I),3)
1590 NEXTI
1600 IF HC$<>"Y"GOTO1640
1610 LPRINT"SELECTED MEALS FOR WEEK OF ";DATE$:LPRINT"
     ":LPRINT" "
1620 FORI=1TOMM:LPRINTRF$(SL(I),1);" - ";RF$(SL(I),3):NEXTI
1630 FORI=1TO66-(MM+3):LPRINT" ":NEXTI
1640 INPUT"HIT ENTER FOR SHOPPING LIST";A$
1650 '**********************
1660 ' SORT SHOPPING LIST *
1670 '**********************
1680 PRINT "*** SORTING SHOPPING LIST ***"
1690 K=0
1700 FORI=1TOGC
1710 IF GF(I,1)=0 GOTO 1740
1720 K=K+1
1730 GL(K)=GF(I,1):GL$(K,1)=GF$(I,1):GL$(K,2)=GF$(I,2):GL$
     (K,3)=GF$(I,3)
1740 NEXT I
1750 FOR I=1TOK-1
1760 FOR J=I+1TOK
1770 IF GL$(I,3)<=GL$(J,3) GOTO1810
1780 GL(0)=GL(I):GL$(0,1)=GL$(I,1):GL$(0,2)=GL$(I,2):GL$
     (0,3)=GL$(I,3)
1790 GL(I)=GL(J):GL$(I,1)=GL$(J,1):GL$(I,2)=GL$(J,2):GL$
     (I,3)=GL$(J,3)
1800 GL(J)=GL(0):GL$(J,1)=GL$(0,1):GL$(J,2)=GL$(0,2):GL$
     (J,3)=GL$(0,3)
1810 NEXT J
1820 NEXT I
1830 '**********************
1840 ' PRINT SHOPPING LIST *
1850 '**********************
1860 FL$="%                          %   #### %%  %
     %"
1870 CLS:PRINT TAB(5)"CANDY'S SHOPPING LIST FOR WEEK OF ";
     DATE$:PRINT
1880 FORI=1TOK
1890 PRINT USING FL$;GL$(I,1),GL(I),GL$(I,2),GL$(I,3)
1900 NEXTI
1910 IFHC$<>"Y"GOTO1960
1920 LPRINT"CANDY'S SHOPPING LIST FOR WEEK OF ";DATE$:LPRINT"
     ":LPRINT" "
1930 FORI=1TOK
1940 LPRINTUSINGFL$;GL$(I,1),GL(I),GL$(I,2),GL$(I,3)
1950 NEXTI
1960 PRINT:INPUT"HIT ENTER TO CONTINUE";A$
1970 RETURN
1980 '************************
1990 ' FILE MAINTAIN RECIPES *
2000 '************************
2010 CLS
2020 PRINT"FILE MAINTAIN RECIPE FILE"
2030 INPUT"ENTER 1 TO ADD, 2 TO CHANGE, 3 TO DELETE";F
2040 IF F<1 OR F>3 GOTO 2030
2050 ON F GOSUB 2080 ,2420 ,2720
2060 RETURN
2070 '**********************
2080 ' ADD TO RECIPE FILE *
2090 '**********************
2100 RN$=""
2110 INPUT"ENTER RECIPE NAME";RN$
2120 IF RN$=""RETURN
2130 RC=RC+1
2140 INPUT"ENTER COOKBOOK REFERENCE";CB$
2150 FORK=1TO20:E(K,1)=0:E(K,2)=0:NEXTK
2160 K=0
2170 K=K+1
2180 T$="":INPUT"ENTER INGREDIENT NAME";T$
2190 IF T$=""K=K-1:GOTO2290
2200 GOSUB3750 ' FIND INGREDIENT
2210 IF L=0 GOSUB 3870
2220 IF L=0 GOTO 2180
2230 Q=0:PRINT"ENTER NUMBER OF ";GF$(L,2);"'S REQUIRED";:INPUTQ
2240 IFQ<=0 GOTO 2230
2250 E(K,1)=L
2260 E(K,2)=Q
2270 GOTO2170
2280 '******************
2290 ' RESTORE RECIPE *
2300 '******************
2310 RF$(RC,1)=RN$ ' RECIPE NAME
2320 RF$(RC,3)=CB$ ' COOKBOOK REFERENCE
2330 A$=""
2340 A$=A$+STR$(K)
2350 FORI=1TOK
2360 A$=A$+CHR$(126)+STR$(E(I,1))+CHR$(126)+STR$(E(I,2))
2370 NEXTI
2380 A$=A$+CHR$(126)
2390 RF$(RC,2)=A$
2400 GOTO2100
2410 '**********************
2420 ' CHANGE RECIPE FILE *
2430 '**********************
2440 T$="":INPUT"WHICH RECIPE DO YOU WISH TO CHANGE";T$
2450 IF T$="" RETURN
2460 FORI=1TORC
2470 J=INSTR(RF$(I,1),T$)
2480 IFJ<>0GOTO2510 ' J=1 IF FOUND
2490 NEXT I
2500 PRINT T$;" NOT FOUND":GOTO2440
2510 PRINT"IS THIS THE ONE ";RF$(I,1);"?  (Y/N)";:A$="":INPUTA$
2520 IF A$<>"Y" GOTO2490
2530 GOSUB4000 ' UNPARSE INGREDIENT STRING
2540 RN$="":PRINT"ENTER CHANGE FOR RECIPE NAME ";RF$(I,1);
     "?":INPUT RN$
2550 IF RN$<>""THENRF$(I,1)=RN$
2560 CB$="":PRINT"ENTER CHANGE FOR COOKBOOK REFERENCE ";
     RF$(I,3);"?":INPUT CB$
2570 IF CB$<>""THENRF$(I,3)=CB$
2580 A$="":INPUT"DO YOU WANT TO CHANGE ANY INGREDIENTS";A$
2590 IFA$<>"Y"THEN2420
2600 CLS:PRINT RF$(I,1);" - ";RF$(I,3):PRINT
2610 L2$="##  %                          % ##.## %  %"
2620 PRINT"NO. INGREDIENT                    QTY UNITS"
2630 FORJ=1TOK
2640 PRINTUSINGL2$;J,GF$(E(J,1),1),E(J,2),GF$(E(J,1),2)
2650 NEXTJ
2660 IN=0:INPUT"ENTER INGREDIENT NUMBER TO CHANGE";IN
2670 IF IN<0 OR IN>K+1 GOTO 2660
2680 IF IN=0 GOTO 2440
```

PROGRAM LISTINGS

```
2690 IF IN=K+1GOSUB4750 ELSEGOSUB4910
2700 GOTO2600
2710 '*****************
2720 ' DELETE RECIPE *
2730 '*****************
2740 T$="":INPUT"WHICH RECIPE DO YOU WANT TO DELETE";T$
2750 IF T$=""RETURN
2760 FORI=1TORC
2770 J=INSTR(RF$(I,1),T$)
2780 IFJ<>0GOTO2810
2790 NEXTI
2800 PRINT T$;" NOT FOUND":GOTO 2740
2810 PRINT"IS THIS THE ONE '";RF$(I,1);"' (Y/N)";:A$=""
     :INPUTA$
2820 IFA$<>"Y"GOTO2790
2830 FORJ=ITORC-1
2840 RF$(J,1)=RF$(J+1,1):RF$(J,2)=RF$(J+1,2):RF$(J,3)
     =RF$(J+1,3)
2850 NEXT J
2860 RC=RC-1
2870 GOTO 2740
2880 '*****************************
2890 ' FILE MAINTAIN INGREDIENTS *
2900 '*****************************
2910 CLS
2920 PRINT"FILE MAINTAIN INGREDIENTS FILE"
2930 INPUT"ENTER 1 TO ADD, 2 TO CHANGE, 3 TO DELETE";F
2940 IF F<1 OR F>3 GOTO 2930
2950 ON F GOSUB 2980 ,3090 ,3280
2960 RETURN
2970 '*****************************
2980 ' ADD TO INGREDIENTS FILE *
2990 '*****************************
3000 D$="":U$="":C$=""
3010 INPUT"ENTER DESCRIPTION";D$
3020 IF D$=""RETURN
3030 GC=GC+1
3040 INPUT"ENTER UNITS";U$
3050 INPUT"ENTER CATEGORY";C$
3060 GF$(GC,1)=D$:GF$(GC,2)=U$:GF$(GC,3)=C$:GF(GC,1)=0
3070 GOTO2990
3080 '*****************************
3090 ' CHANGE INGREDIENCE FILE *
3100 '*****************************
3110 T$="":INPUT"WHICH INGREDIENT DO YOU WISH TO CHANGE";T$
3120 IF T$="" RETURN
3130 FOR I=1TOGC
3140 J=INSTR(GF$(I,1),T$)
3150 IFJ<>0 GOTO 3180 ' J=1 IF FOUND
3160 NEXT I
3170 PRINT T$;" NOT FOUND":GOTO3110
3180 PRINT"IS THIS THE ONE '";GF$(I,1);"' (Y/N)";:INPUT A$
3190 IF A$<>"Y" GOTO 3160
3200 D$="":PRINT"ENTER CHANGE FOR DESCRIPTION '";GF$(I,1);
     "'";:INPUT D$
3210 IF D$<>"" THEN GF$(I,1)=D$
3220 U$="":PRINT"ENTER CHANGE FOR UNITS '";GF$(I,2);"'";
     :INPUTU$
3230 IF U$<>"" THEN GF$(I,2)=U$
3240 C$="":PRINT"ENTER CHANGE FOR CATEGORY '";GF$(I,3);"'
     ";:INPUT C$
3250 IF C$<>""THEN GF$(I,3)=C$
3260 GOTO3110
3270 '************************
3280 ' DELETE AN INGREDIENT *
3290 '************************
3300 T$="":INPUT"WHICH INGREDIENT DO YOU WISH TO DELETE";T$
3310 IF T$=""RETURN
3320 FORI=1TOGC
3330 J=INSTR(GF$(I,1),T$)
3340 IFJ<>0 GOTO 3370 ' J=1 IF FOUND
3350 NEXT I
3360 PRINT T$;" NOT FOUND":GOTO3300
3370 PRINT"IS THIS THE ONE '";GF$(I,1);"' (Y/N)";:INPUT A$
3380 IF A$<>"Y" GOTO 3350
3390 FOR J=ITOGC-1
3400 GF$(J,1)=GF$(J+1,1):GF$(J,2)=GF$(J+1,2):GF$(J,3)
     =GF$(J+1,3)
```

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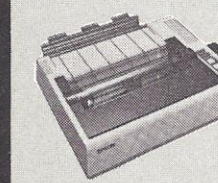

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CIRCLE 92

```
3410 NEXT J
3420 GC=GC-1
3430 GOTO 3300
3440 '****************
3450 ' LIST RECIPES *
3460 '****************
3470 CLS:PRINT TAB(5) "RECIPE FILE":PRINT
3990 '************************
4000 ' UNPARSE RECIPE FILE *
4010 '************************
4020 T$=CHR$(126)
4030 L=INSTR(RF$(I,2),T$)
4040 K=VAL(LEFT$(RF$(I,2),L-1))
4050 FOR M=1TOK
4060 N=INSTR(L+1,RF$(I,2),T$)
4070 E(M,1)=VAL(MID$(RF$(I,2),L+1,N-L-1))
4080 P=INSTR(N+1,RF$(I,2),T$)
4090 E(M,2)=VAL(MID$(RF$(I,2),N+1,P-N-1))
4100 L=P
4110 NEXT M
4120 RETURN
4130 '***************
4140 ' FIND RECIPE *
4150 '***************
4160 FOR R=1 TO RC
4170 J=INSTR(RF$(R,1),M$)
4180 IF J<>0 GOTO 4220
4190 NEXT R
4200 R=0
4210 RETURN
4220 PRINT"IS THIS THE ONE '";RF$(R,1);"' (Y/N)";:A$="":
     INPUTA$
4230 IF A$="Y" THEN 4210 ELSE 4190
4240 '*******************************
4250 ' SAVE INGREDIENTS & RECIPES *
4260 '*******************************
4270 IFGC=0ANDRC=0PRINT"NO FILES TO SAVE":INPUT"HIT ENTER
     TO CONTINUE";A$:RETURN
4280 GOSUB 4510 :PRINT"** SAVING FILES **"
4290 F$="INGRED/FLE"
4300 OPEN "O",1,F$
4310 PRINT#1,GC;
4320 FORI=1TOGC
4330 PRINT#1,GF(I,1);
4340 NEXTI
4350 FORI=1TOGC
4360 PRINT#1,CHR$(34);GF$(I,1);CHR$(34);
4370 PRINT#1,CHR$(34);GF$(I,2);CHR$(34);
4380 PRINT#1,CHR$(34);GF$(I,3);CHR$(34);
4390 NEXTI
4400 CLOSE 1
4410 F$="RECIPE/FLE"
4420 OPEN "O",2,F$
4430 PRINT#2,RC;
4440 FORI=1TORC
4450 PRINT#2,CHR$(34);RF$(I,1);CHR$(34);
4460 PRINT#2,CHR$(34);RF$(I,2);CHR$(34);
4470 PRINT#2,CHR$(34);RF$(I,3);CHR$(34);
4480 NEXTI
4490 CLOSE 2
4500 RETURN
4510 INPUT"READY DISK, THEN HIT ENTER";A$:RETURN
4520 '*******************************
4530 ' LOAD INGREDIENTS & RECIPES *
4540 '*******************************
4550 GOSUB 4510 :PRINT"** LOADING INGREDIENTS & RECIPES **"
4560 F$="INGRED/FLE"
4570 OPEN"I",1,F$
4580 INPUT#1,GC
4590 FORI=1TOGC
4600 INPUT#1,GF(I,1)
4610 NEXT I
4620 FOR I=1TOGC
4630 INPUT#1,GF$(I,1),GF$(I,2),GF$(I,3)
4640 NEXTI
4650 CLOSE 1
4660 F$="RECIPE/FLE"
4670 OPEN"I",2,F$
4680 INPUT#2,RC
4690 FORI=1TORC
4700 INPUT#2,RF$(I,1),RF$(I,2),RF$(I,3)
4710 NEXTI
4720 CLOSE 2
4730 RETURN
4740 '*****************************
4750 ' ADD INGREDIENT TO RECIPE *
4760 '*****************************
4770 K=K+1
4780 T$="":INPUT"ENTER INGREDIENT NAME";T$
4790 IFT$=""THENK=K-1:GOTO4880 ' STORE RESULTS
4800 GOSUB 3750 ' FIND INGREDIENTS
4810 IF L=0 GOSUB 3870
4820 IF L=0 GOTO 4780
4830 Q=0:PRINT"ENTER NUMBER OF ";GF$(L,2);"'S REQUIRED";:INPUTQ
4840 IFQ<=0GOTO4830
4850 E(K,1)=L
4860 E(K,2)=Q
4870 GOTO 4770
4880 GOSUB 5040 ' STORE RESULTS
4890 RETURN
4900 '*******************************
4910 ' CHANGE INGREDIENT IN RECIPE *
4920 '*******************************
4930 T$="":PRINT"ENTER CHANGE FOR INGREDIENT '";GF$(E(IN,1),1);
     "'":INPUT T$
4940 IF T$=""GOTO4990
4950 GOSUB3750 ' FIND NEW INGREDIENTT
4960 IF L=0 GOSUB 3870 ' ADD NEW INGREDIENT
4970 IF L=0 GOTO 4990 ' NO CHANGE
4980 E(IN,1)=L
4990 Q=0:PRINT"ENTER CHANGE FOR NUMBER OF ";GF$(E(IN,1),2);
     "'S '";E(IN,2);"'"
5000 INPUT Q
5010 IF Q>0THEN E(IN,2)=Q
5020 GOSUB 5040 :RETURN
5030 '**********************
5040 ' STORE INGREDIENTS *
5050 '**********************
5060 A$=""
5070 A$=A$+STR$(K)
5080 FOR P=1TOK
5090 A$=A$+CHR$(126)+STR$(E(P,1))+CHR$(126)+STR$(E(P,2))
5100 NEXTP
5110 A$=A$+CHR$(126)
5120 RF$(I,2)=A$
5130 RETURN
3480 FORI=1TORC
3490 IF RC=0 GOTO 3590
3500 GOSUB4000 ' UNPARSE STRING
3510 PRINT I;".) ";RF$(I,1)
3520 PRINT TAB(LEN(STR$(I))+4) RF$(I,3)
3530 PRINT
3540 L2$="##  %                          % ##.## %  %"
3550 PRINT"NO. INGREDIENT                    QTY  UNITS"
3560 FOR J=1TOK
3570 PRINT USING L2$;J,GF$(E(J,1),1),E(J,2),GF$(E(J,1),2)
3580 NEXT J
3590 PRINT:INPUT"HIT ENTER TO CONTINUE";A$
3600 NEXTI
3610 RETURN
3620 '*************************
3630 ' LIST INGREDIENTS FILE *
3640 '*************************
3650 CLS:PRINTTAB(15)"INGREDIENTS FILE":PRINT
3660 L3$="### %                          % %  % %              %"
3670 PRINT"NO. INGREDIENTS                UNIT CATEGORY"
3680 FOR I=1TOGC
3690 PRINT USING L3$;I,GF$(I,1),GF$(I,2),GF$(I,3)
3700 NEXT I
3710 PRINT
3720 INPUT"HIT ENTER TO RETURN";A$
3730 RETURN
3740 '*******************
3750 ' FIND INGREDIENT *
3760 '*******************
3770 FORL=1TOGC
3780 J=INSTR(GF$(L,1),T$)
3790 IF J<>0 GOTO 3830
3800 NEXTL
3810 L=0
3820 RETURN
3830 PRINT"IS THIS THE ONE '";GF$(L,1);"' (Y/N)";:A$="":
     INPUTA$
3840 IFA$="Y"GOTO3820
3850 GOTO3800
3860 '*************************
3870 ' ADD TO INGREDIENT FILE *
3880 '*************************
3890 PRINT"INGREDIENT '";T$;"' NOT FOUND. DO YOU WANT TO
     ADD IT (Y/N)";
3900 A$="":INPUTA$
3910 IF A$<>"Y"RETURN
3920 D$=T$
3930 GC=GC+1
3940 INPUT"ENTER UNITS";U$
3950 INPUT"ENTER CATEGORY";C$
3960 GF$(GC,1)=D$:GF$(GC,2)=U$:GF$(GC,3)=C$:GF(GC,1)=0
3970 L=GC
3980 RETURN
```

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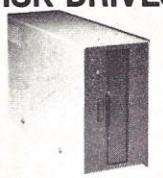

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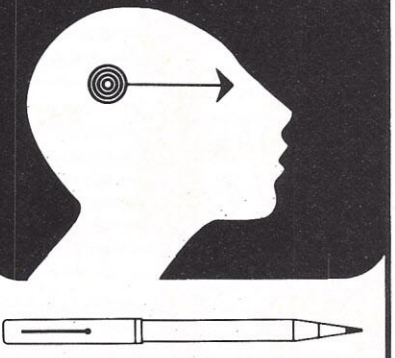

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Byte Shop/Placentia (714) 524-5380
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Central Campbell Computers (408) 370-0199
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Computer Age (714) 565-4042
Computer Center (415) 845-6366
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Computer Forum (213) 921-2111
Computerland (213) 371-4624
Computerland (714) 464-5656
Computerland (714) 560-9912
Computerland (805) 928-1919
Computerland (415) 794-9311
Computerland (408) 246-4500
Computerland (408) 267-2182
Computerland (408) 253-8080
Computerland/El Cerrito (415) 527-8844
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Computerland/Pasadena (213) 449-3205
Computerland/Sacramento (916) 920-8981
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Computer Plus (805) 963-4542
Computer Plus (408) 735-1199
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Computer Post (415) 790-0410
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Computer Scene (707) 462-1578
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Computer Sound (805) 945-5921
Computers To-Go (805) 496-2868
Computer Store (213) 451-0713
Computer Store Chula Vista (714) 281-0285
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Computerland/Hartford (203) 727-1857
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Computerland/New Castle (302) 738-9656
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Computerland/Southfield	(313) 356-8111
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Computer Mart/Flint	(313) 234-0161
Computer Mart/Lansing	(517) 351-1777
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Computer Room	(616) 949-2802
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Heathkit Electr. Ctr.	(313) 535-6480
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Computerland	(612) 933-8841
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Computerland	(612) 333-3151
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Computerland/Grand Forks	(701) 746-0491
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Micro Age Computer Store	(402) 564-7213
Computerland/Lincoln	(402) 391-6716
Computerland/Omaha	(402) 391-6716
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Bitznoytes	(603) 224-8233
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Computer City	(603) 668-9527
Computerland/Nashua	(603) 889-5238
Computer Mart/New Hampshire	(603) 883-2386
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Silent Partner	(201) 947-9400
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Computer Forum	(201) 530-9103
Computerland	(201) 845-9303
Computerland/Cherry Hill	(609) 795-5900
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Radio Shack	(609) 234-2666
Software City	(201) 342-8788
Stoneledge Computer	(201) 277-1020
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Century 23	(702) 870-1534
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PCS Computer Service	(702) 870-4138
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Aristo-Craft Distinctive	(212) 279-9034
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Computer Center	(212) 889-8130
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Computer Era	(212) 860-0500
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Computerland/Ithaca	(607) 277-4888
Computerland/Massina	(315) 769-9971
Computerland/Nassau County	(516) 742-2262
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Computer Room	(518) 869-3818
Computer Shoppe	(516) 732-4446
Computer Store	(914) 428-1661
Computer Store-Rochester	(716) 244-5000
Computer Tree	(607) 748-1223
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Future Visions Computer	(516) 423-7820
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Harrison Radio	(516) 293-7990
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Heathkit Electrs.	(716) 835-3090
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Magazine Emporium	(212) 864-0500
Majority New Dist.	(212) 243-7770
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Mr. Computer	(914) 297-1223
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Basic Computer Shop	(216) 867-0808
Cincinnati Computer Store	(513) 671-6440
Computer Connection	(419) 222-6464
Computer Corner	(216) 473-5010
Computerland/Akron-Canton	(216) 493-7786
Computerland/Cleveland	(216) 461-1200
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Micro Mini Computer World	(614) 235-5813
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News - Readers	(513) 879-4444
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Newstand	(216) 235-9321
Wilkie News	(513) 223-2541
21st Century	(513) 651-2111
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Computerland/Tulsa	(918) 481-0332
Computer Service Unlimited	(405) 329-2154
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L & R Electrs.	(503) 476-9611
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Computerland/Harrisburg	(814) 533-6892
Computerland/Lehigh Valley	(215) 776-0202
Computerland/Paoli	(215) 296-0210
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Heathkit Electr. Ctr.	(215) 647-5555
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Pittsburgh Computer Store	(412) 341-6301
20 20 Computers	(215) 439-1800
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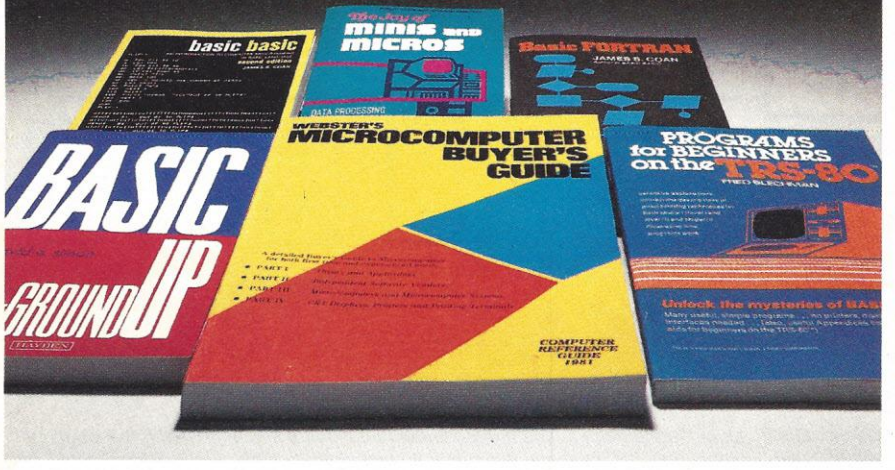

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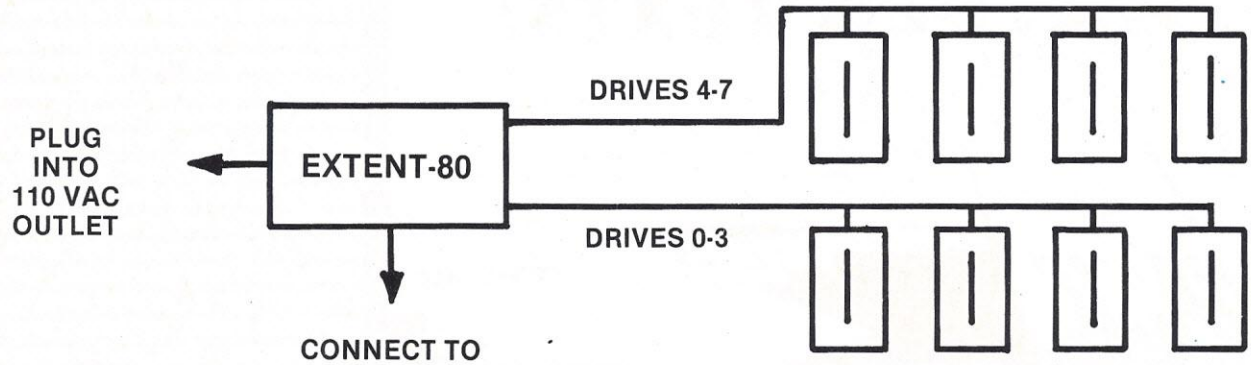

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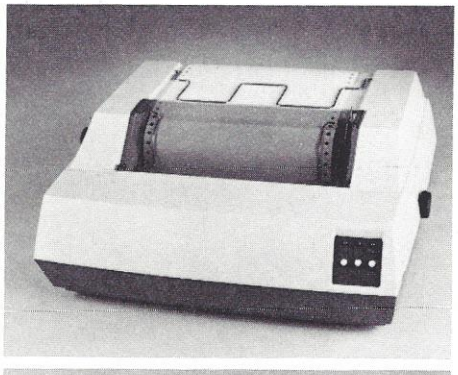

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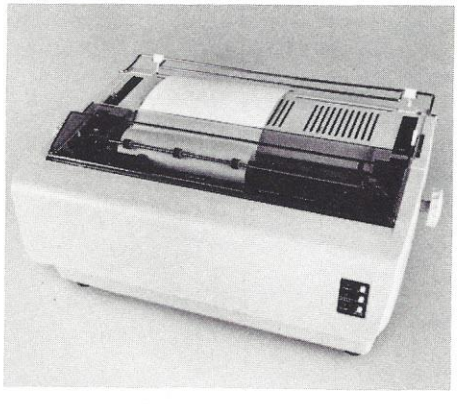

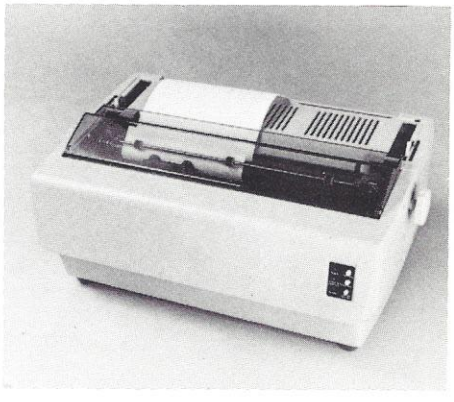

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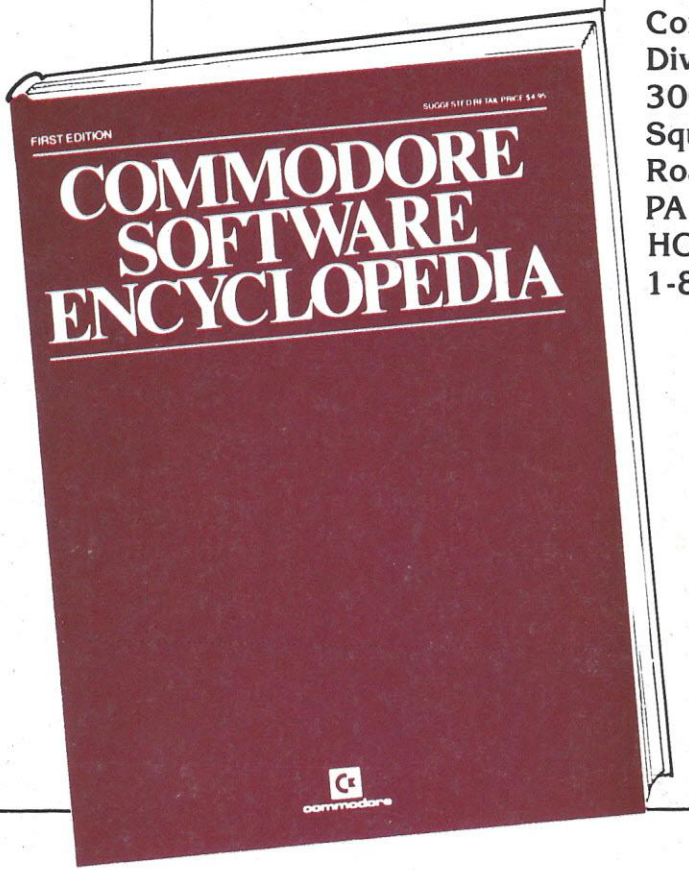

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